How the South African Government Responded to the United Nations International Decade for Natural Disaster Reduction: A Policy Review

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Declaration

The study represents an original undertaking by the author. Where use has been made of the work of others it has been duly acknowledged in the text. This dissertation has not been submitted in any form for a degree to any other University.

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Contents

Acronyms and Abbreviations

ACDS	African Centre for Disaster Studies
CEO	Chief Executive Officer
DiMP	Disaster Mitigation for Sustainable Livelihoods Project
DRB	Disaster Response Branch
DWAF	Department of Water Affairs and Forestry
ERC	Emergency Reconstruction Committee
FAD	Food Availability Decline
FED	Food Entitlement Decline
FFC	Financial and Fiscal Commission
GNP	Gross National Product
HDI	Human Development Index
IDNDR	International Decade for Natural Disaster Reduction
IMC	Inter-Ministerial Committee for Disaster Management
IRIN	Integrated Regional Information Network
ISDR	International Strategy for Disaster Reduction
JOC	Joint Operational Committee
MEC	Member of Executive Committee
NDMC	National Disaster Management Committee
NDM Centre	National Disaster Management Centre
NGO	Non-governmental Organization
NPRA	Northern Province Roads Agency
OCHA	Office for the Coordination of Humanitarian Affairs
PAR	Pressure and Release Model
SA	South Africa
SABC	South African Broadcasting Corporation
SADC	Southern African Development Community
SALGA	South African Local Government Association
SANDF	South African National Defence Force
SAPS	South African Police Services
SARDC	Southern African Research and Documentation Centre
SASAR	South African Search and Rescue Organization
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UN DMPT	United Nations Disaster Management Training Programme
UNDP	United Nations Development Programme
US	United States of America
USA	United States of America
USAID	United States Agency for International Development

How the South African Government Responded to the United Nations International Decade for Natural Disaster Reduction: A Policy Review

Chapter 1: Introduction

Section 1.1: Aims and Objectives

What plagues and what portents, what mutiny
What raging of the sea, shaking of the earth,
Commotion in the winds, frights, changes, horrors
Divert and crack, rend and deracinate
The unity and married calm of states

Ulysses in Troilus and Cressida
Act 01, Scene iii
William Shakespeare (1564-1616)

Until recently, dominant natural hazard management capacities focused on post-disaster[1] activities - particularly the emergency itself - with the objective being to reduce losses, damages, and disruptions, and to enable rapid recovery when catastrophes occur (Jegillos, 1999). This approach, dubbed "emergency management", ignores the root causes, dynamic pressures and unsafe conditions, which lead to the disaster occurrence (Blaikie, Cannon, Davis and Wisner, 1994). This failure to address the socio-economic vulnerability factors that contribute to risk has resulted in increasing loss. For example, recent statistics suggest that throughout the 1960s global economic losses attributed to disasters with a natural trigger totaled a mere United States

[1] For the purpose of this study, a disaster is defined as an event associated with the impact of a natural hazard, which leads to increased mortality, illness and/or injury, and destroys or disrupts livelihoods, affecting the people of an area such that they (and/or outsiders) perceive it as being exceptional and requiring assistance for recovery (Cannon, 1994, qtd. in Varley, 1994, p. 29).

(US) 1 billion[2] Dollars per year (Berz, qtd. in United Nations, 1999a). By the early 1990s, those costs escalated to an average of more than US 40 billion Dollars per year (Berz, qtd. in United Nations, 1999a); and in 1998, disasters with a natural trigger claimed the lives of more than 50,000 people and caused economic losses of an estimated US 90 billion Dollars (United Nations, 1999c). Other statistics suggest that 97 percent of all deaths caused by disasters with a natural trigger occur in developing countries and, although smaller in absolute figures, the percentage of economic loss in relation to the Gross National Product (GNP) in developing countries significantly exceeds that in developing countries (United Nations International Strategy for Disaster Reduction, 2002b). In order to address these trends, several researchers began to question the established strategies for managing disasters and natural hazards (Varley, 1994). Some of the most influential recommendations originated from O'Keefe, Westgate and Wisner (1976). They argue that disasters with a natural trigger are more a consequence of socioeconomic conditions than natural factors and that it is, therefore, more appropriate to focus hazard research and efforts on social processes - in particular on human vulnerability - than on geophysical hazards (O'Keefe et al., 1976). The development of these and similar suggestions influenced the Member States of the United Nations (UN) to reexamine how they perceive and manage hazards and disasters. Consequently, the UN General Assembly designated the 1990s as the International Decade for Natural Disaster Reduction (IDNDR) (United Nations, 1987).

The basic aim of the IDNDR was "to encourage the recent trend in natural disaster management from a reactive strategy of post-disaster improvisation, which relies heavily on relief aid, to a more pro-active strategy of pre-disaster planning and preparedness" (Lechat, 1990, qtd. in Smith, 1996, p. 342). The Decade achieved this aim. More specifically, the research that was presented during the IDNDR popularized the notion that disaster researchers and practitioners should focus on managing and studying disaster risk processes, rather than focusing on technological improvements and the natural hazard itself, thereby enabling closer links with sustainable development activities.

A total of 155 nations, including South Africa, agreed to ratify the new UN IDNDR disaster risk reduction provisions. However, to date, no one has published information concerning the extent to which South Africa is applying the strategies of the new disaster risk reduction paradigm. This is problematic because without this information we cannot be sure if

[2] 1.00 United States Dollars = 8.02086 South African Rands (X.E.com, 3 June 2003).

South Africa is applying disaster risk reduction strategies. If South Africa is not, the country may continue to be susceptible to the global increase in the occurrence and severity of natural hazards and people may experience avoidable loss. Thus, the purpose of this dissertation is to examine whether or not South Africa is adhering to its shift from emergency management to a comprehensive approach to hazards and disasters that focuses on reducing the risk through development plans, programmes and initiatives.

This study concludes by suggesting that the government of South Africa is in the process of providing an enabling environment for a comprehensive disaster risk reduction system that focuses on reducing the risk of disasters by mitigating their severity through development plans, programs and initiatives. It seems the government of South Africa understands the fundamentals of disaster risk reduction. This understanding is clearly demonstrated in South Africa's Green and White Paper on Disaster Management, as well as in the Disaster Management Bill and Act (Ministry of Provincial Affairs and Constitutional Development, 1998; Department of Constitutional Development, 1998; Minister for Provincial and Local Government, 2001; The Presidency, 2003). Email and telephonic interviews with selected government officials support this conclusion. However, the implementation of the Disaster Management Bill will not commence until the Disaster Management Act and its associated framework and regulation has been promulgated. This means that South Africa's disaster risk reduction system may not be fully implemented for some time. This having been said, this dissertation's case-study evaluation of the February 2000 Limpopo[3] floods reveals that a great number of positive developments have occurred in anticipation of the implementation of the Act. These developments will be examined over the course of this study. It seems the government of South Africa is adhering to its shift from emergency management to disaster risk reduction - albeit very slowly - and that more effort is required from the government before it can be correctly argued that South Africa is exercising all the necessary fundamental principles of disaster risk reduction. The following section explains this study's framework, which led to its conclusion.

[3] The name of the "Northern Province" was changed to "Limpopo" in February 2002. For a map of Limpopo see Annex A of this study.

1.1.1 Outline of the Study

In order to achieve this study's objectives, the remainder of this paper is structured as follows:

CHAPTER 1- "Introduction" - introduces the study and provides an explanation of, as well as the rationale for, the methodology of this dissertation.

CHAPTER 2 - "Fundamentals of Disaster Risk Reduction: Identifying Best Practices" - examines the literature and the theoretical framework that influenced the Member States of the UN to declare the 1990s as the IDNDR. This chapter also outlines the activities and achievements of the IDNDR, including the legislative changes South Africa agreed to undertake in order to increase its capacity to manage and reduce the risk and, thus, the occurrence and magnitude of disasters with a natural trigger.

CHAPTER 3 - "Disaster Management in South Africa" - summaries the weaknesses and constraints within South Africa's pre-IDNDR disaster management system, and examines the legislative changes the government pursued, or is pursing, in order to overcome these deficiencies. This chapter concludes by examining how these policies are being applied.

CHAPTER 4 - "Conclusion" - wraps up the study by summarizing the South African government's rhetorical and applied efforts relating to its shift from emergency management to disaster risk reduction. The chapter also suggests several mitigation and risk reduction strategies that should have been implemented in Limpopo and the implications that may arise from this fundamental change in approach to hazards and sustainable development.

SECTION 1.2: Methodology

This study utilizes primary and secondary data obtained from policy documents, media releases and primary and secondary publications. Information was also obtained from interviews with key government officials and personal communications with prominent researchers. Three separate email interviews have been conducted with George Kilian (email interviews, 16

January, 25 March 2003 and 4 June 2003). Baldwin Ramasobane and Philip Mulaudzi were each interviewed telephonically (telephonic interview, 22 January 2003; telephonic interview, 4 June 2003). George Kilian is the South African NDM Centre's Director of Policy and Coordination and was assigned the role of "Secretariat" during the development of South Africa's White Paper on Disaster Management (Department of Constitutional Development, 1998). Baldwin Ramasobane is Limpopo's General Manager of Information Technology and Information Management. Ramasobane is cited as the contact person for the then Northern Province's Plan for Reconstructing Flood-Damaged Public Infrastructure in the Northern Province (Office of the Premier of the Northern Province, 2000). Philip Mulaudzi is the Director / Manager of the Provincial Disaster Management Centre in Limpopo. Ailsa Holloway, who was a member of the IDNDR's Scientific and Technical Committee as well as a drafting team member for South Africa's Green and White Papers on Disaster Management, provided expert guidance via email communications. Cathy Oelofse, a Lecturer from the University of KwaZulu Natal's School of Life and Environmental Sciences, Masingita Khandlhela, a Research Intern from the University of KwaZulu Natal University's Faculty of Community and Development Disciplines, and Astrid Von Kutz, the University's Head of School of Community Development and Adult Learning, provided expertise via personal communications (personal communication, May 2002; personal communications, September through December 2002; personal communications, May 2002).

The February 2000 Limpopo floods is an appropriate case study to examine how the South African government is responding to the UN IDNDR, for several reasons. As a case study, this incident will offer empirical evidence demonstrating how the South African government is applying the legislative changes it agreed to undertake during the IDNDR. Since these particular floods occurred after the conclusion of the IDNDR, the South African government was able to draw from all the IDNDR resources, and thus should have a complete and accurate understanding of the disaster risk reduction strategies it agreed to exercise. Furthermore, being an example of a flood, the February 2000 Limpopo hazard is an example of what can potentially trigger the most severe type of disaster[4]. The area most affected by the Limpopo floods is flood prone and thus requires intensive risk reduction attention (Cathy Oelofse, personal communication, May 2002). While floods are potentially beneficial - for example, floods irrigate

[4] According to Blaikie, Cannon, Davis and Wisner (1994), floods are the most severe type of hazards as they contribute to the greatest loss of life.

the soil, which may improve growing conditions, thereby increasing agricultural returns - Science in Africa (2002) dubbed the year 2000 floods as the worst humanitarian disaster to occur within southern Africa. As such, the devastating nature of this particular incident makes it relevant as a case study. It should also be noted that the post-disaster reconstruction period is regarded as the most opportune time to introduce disaster risk reduction into sustainable development planning (United Nations International Strategy for Disaster Reduction, 2002a, p. 28; Blaikie et al., 1994). Finally, because the South African government has been given a reasonable amount of time to respond to the February 2000 floods, this researcher is able to examine the government's complete response to the disaster, including most efforts to minimize the risk of a disaster of this magnitude from occurring again. As such, the February 2000 Limpopo floods is an appropriate case study to examine how the South African government is responding to the UN IDNDR.

SECTION 1.3: Limitations of the Study

Given the aforementioned methodology of this study, this dissertation contains several empirical limitations, two of which are related to the case study of choice. They are as follows: first, the February 2000 Limpopo floods occurred before Cabinet's final approval of the Disaster Management Bill and its promulgation and implementation as an Act. During the flood period, the draft Bill had been publicly released and the deadline for public comment had expired; nonetheless, the Government's actual response to the floods may have differed if the floods occurred following the final approval of the Disaster Management Bill. While this point is acknowledged, this study will continue to utilize the February 2000 Limpopo floods as a case study, for two primary reasons. First, because there has not been another South African disaster with a natural trigger equaling the impact of the February 2000 Limpopo floods between the culmination of the UN IDNDR and the drafting of this study. Second, because the aim of this study is to assess how the South African government is responding to the UN IDNDR, which is not dependent on the final acceptance and implementation of the Disaster Management Bill. In other words, despite the fact that the Act was not implemented, the mechanisms and ideology of the Act were already well established within the governing body. As such, the point that the Disaster Management Act had not been promulgated within the desired time period is, to a great extent, moot.

The second empirical limitation of this dissertation's methodology concerns the fact that this study examines the Government's response to the February 2000 Limpopo floods, a single event within a limited boundary. The criticism could be that this methodological approach may ignore all the other disaster risk reduction practices the Government is currently implementing. While some people may believe the latter statement is true, the author of this study maintains that a case study examining the February 2000 Limpopo disaster clearly illustrates the effectiveness of risk reduction measures in the South African context, and, secondly, because the same fundamental elements are present in every disaster reduction strategy (United Nations International Strategy for Disaster Reduction, 2002a). Furthermore, hydrometrological events are typically multi-hazard occurrences. The February 2000 Limpopo floods, for example, involved heavy winds and rains in addition to riverine flooding. Thus, an examination of two or more case studies involving different natural hazards would not fit within the scope of this study. An additional limitation regarding this dissertation's methodology concerns the fact that there is not a pre-subscribed, or precedent, method that dictates how to evaluate disaster risk reduction processes. Subsequently, any attempt to examine or deconstruct disaster risk reduction is subjective, and may be subject to certain limitations. While this argument is valid, it also highlights the potential usefulness of this exercise - since no other person or organization has published information expressing how effectively an individual government has responded to the IDNDR (Khandlhela, personal communication, September 2002; Von Kotze, personal communication, May 2002). Peet Stopforth, from the Department of Constitutional Affairs, South Africa, has published information concerning the South African government's disaster risk reduction public policy responses (qtd. in United Nations, 1999a). However, to date, no one has formally attempted to examine how these policies are being applied, or whether the related departments are exercising disaster risk reduction strategies. It may be important to discuss these issues with the Department of Water Affairs and Forestry (DWAF) and the other 16 departments involved in hazard and disaster management (Ministry of Provincial Affairs and Constitutional Development, 1998); however, given the restrictions of this research it was only possible to discuss these issues with representatives from the coordinating agencies.

The following chapter, entitled "Fundamentals of Disaster Risk Reduction: Identifying Best Practices", explores several publications that conceptualize the UN General Assembly's declaration of the 1990s as the IDNDR. The chapter also outlines the theoretical framework that

espoused disaster risk reduction. The chapter concludes by examining the activities and achievements of the IDNDR, including the legislative changes South Africa agreed to undertake in order to increase its capacity to manage and reduce the risk and, thus, the occurrence and magnitude of disasters with a natural trigger.

CHAPTER 2: FUNDAMENTALS OF DISASTER RISK REDUCTION: IDENTIFYING BEST PRACTICES

Disasters with a natural trigger have a devastating impact on the population and environment (United Nations, 1999c). Yet, as this chapter will demonstrate, it was not until the 1970s that people began to question the traditional, and some may say archaic, ways in which we, until very recently, perceived and managed natural hazards and disasters. The innovative ideas that arose from this 1970s movement formed the basis of three separate, but linked, multi-disciplinary areas of study and *modus operandi* known as "hazard science", "vulnerability science" and "disaster management". This chapter provides an in-depth examination of the history and underlying philosophy of each of these three areas of study and *modus operandi* and the ways in which they contributed to disaster risk reduction, a more holistic approach to hazards and disasters focusing on minimizing socio-economic vulnerabilities and the adverse effects of hazards. This chapter concludes by introducing and examining the accomplishments of the UN IDNDR.

SECTION 2.1: Literature Review

Systematic social research into natural hazards can only be traced as far back as 1936 with the work of Gilbert White, who was the first to recognize that structural schemes are not the only way to reduce the risk of floods (Smith, 1996; Alexander, 1997; Lechat, 1994). By the 1970s, a significant number of researchers in a wide variety of academic disciplines began to examine the underlying philosophy of risk. This effort was largely initiated in response to the devastation caused by the occurrence of the Sahelian drought, the failure of the Peruvian harvest, the 1975/6 drought in northwest Europe and the severe North American winters of 1976/7 and 1977/8 (Smith, 1996). These events, combined with a growing recognition amongst researchers of the paradox that while human and material losses from natural hazards had globally increased during the 20th century there had been no major increase in the frequency of extreme geophysical events, led to several changes in perspective (O'Keefe, Westgate and Wisner, 1976). First, more emphasis was devoted to the relationship between underdevelopment and vulnerability to hazards in the Third World, in particular the extent to which technological "solutions" and relief, all originating in the developed nations, exacerbated the conditions of

dependency, thereby reinforcing vulnerability (Waddel, 1983). Second, so-called "man-made" disasters, including the nuclear incident at Three-Mile Island (USA), began to receive more attention. This increased attention began to blur the distinction between "natural" and "man-made" hazards (Smith, 1996). Third, there was a growing belief that the dominant disaster management strategy - specifically the emergency management approach - could not adequately cope with hazards as they manifested in modern societies. The accumulation of these and other ideas gave momentum to three separate, but linked, multi-disciplinary areas of study and *modus operandi* known as "hazard science", "vulnerability science" and "disaster management".

The hazard sciences are traditionally rooted in an ecological framework. Before the 1970s, the perspective defined hazards as "those elements of the physical environment harmful to man and caused by forces extraneous to him", or as "Acts or God" (Smith, 1996, p. 9). In other words, the hazard sciences traditionally ignored the root causes, dynamic pressures, and unsafe conditions that contribute to disasters (i.e. the progression of vulnerability). Consequently, disasters were reduced to uncontrollable natural or physical problems. This perspective became problematic for two reasons. First, the hazard sciences viewed disasters as linear, with a beginning and an end, rather than as a continuous process, and thus ignored the reality that the communities most affected by disasters are still as vulnerable after the disasters, or even more so. Second, the hazard sciences reduced disasters to uncontrollable natural or physical problems, which did not have solutions. By the 1970s hazard science researchers and practitioners began to accept the suggestion that humans are somewhat responsible for disasters triggered by "natural" hazards. One of the most influential reasons for this radical change in position was the increased global attention given to environmental pollution. By expanding the definition of hazards to include geophysical-, technological- and social-events and by accepting the notion that hazards are "potential threats to humans and their welfare", and risks as "the probability of a specific hazard occurrence", the hazard sciences gained increased approval across academic fields (Smith, 1996, p. 5). As stated by Smith (1996), "In the late twentieth century, awareness of environmental sciences has never been greater" (p. 4). In terms of disaster policy, the hazard sciences have significantly informed the US Hazard Mitigation Bill of 2000 as well as the UN IDNDR.

The vulnerability sciences developed in response to an increased awareness of the limitations of the food availability decline hypothesis (FAD), historically, a dominant theory on

famine. The FAD states that the basic cause of famine is a failure of food supply relative to the population. The FAD perspective became increasingly problematic because, first, it only deals with supply factors (Blaikie et al., 1994). Second, the FAD could not explain why some members in a specific population starve while others do not (Blaikie et al., 1994). Third, the FAD perspective could not identify the social causes of vulnerability and poverty other than in general terms of supply and demand (Blaikie et al., 1994). In 1982, Amartya Sen presented a strong case against the FAD. He showed that there are specific examples where the per capita availability of food was not significantly low but resulted in famine. Therefore, Sen (1982) concludes, famine cannot be accounted for by a simple lack of available food. Sen also suggests that goods reach people through their ability to command that they have goods. At any given moment, each person has an entitlement, or a range of goods that s/he can acquire. This entitlement is determined by the ability of people to trade their services or goods for food necessary for their survival. People starve when their entitlement is not sufficient to buy necessary food. Food availability is, therefore, an issue of income distribution, or of people's ability to provide services that others are willing to pay for. Sen's (1982) theory does not suggest that supply of food is irreverent; Sen does acknowledge, for example, that a decrease in the availability of food may increase prices, which in turn will decrease people's ability to purchase food using their entitlement. Nonetheless, there are criticisms of Sen's food entitlement decline theory (FED). First, there is the boundary problem; if the area is stretched large enough, there is enough food to avert a famine (Blaikie et al., 1994). Second, some famines are clearly originated by FAD (Blaikie et al., 1994). Third, initially, Sen's FED theory perceives entitlements as static and given; Sen himself later acknowledged that they are not (Blaikie et al., 1994). Fourth, FED does not adequately develop the concept of vulnerability (Blaikie et al., 1994). Other theories and perspectives have expanded on Sen's (1982) work. One notable theory which summarizes the same relationships as FED, but links them to global pressures and to the natural hazard is Blaikie et et al.'s (1994) Pressure and Release Model (PAR). The PAR model is currently widely utilized and is discussed in further detail in Section 2.2 of this dissertation (Smith, 1996).

The disaster management approach to hazards is the third multi-disciplinary area of study and *modus operandi* that changed perspectives in the 1970s in response to increasing disapproval with the traditional perception and management of hazards and disasters. Historically, the dominant disaster management approach utilized emergency management strategies.

Practitioners and advocates of emergency management defined the "hazard" as being the calamity directly associated with the natural geophysical process, and the "damage" or the "human action" as the response to the type, magnitude, frequency or other dimension of this process (Hewitt, 1983). According to Hewitt (1983), utilization of the emergency management approach limits people to focus on three main areas: prediction, technological improvements, and relief. Legislatively, this involves a "commitment to the monitoring and scientific understanding of geophysical processes - geologic, hydrologic and atmospheric - as the foundation for dealing with their human significance and impacts" (Hewitt, 1983, p. 6). At the applied level, the emergency management approach involves prediction systems and emergency relief efforts, involving disaster response plans and the establishment of organizations for relief and rehabilitation, all the while subordinating study to action. It is also notable that the emergency management approach is rooted in civil defense and humanitarian assistance organizations and responds to the risk of hazards by applying a sequence of actions. That is to say disaster preparedness always precedes a disaster and that the response and recovery stage always follows.

Some notable criticisms of the emergency management approach to hazards include the reproach that only superficial attention could be given to the basic human problems that may accompany, or interact with, or are initiated by hazard events, such as the loss of livelihood, life-support, shelter and security. These problems may be recognized by the emergency management approach, but they are not studied with the same degree of effort or research that is devoted to, for example, weather or earthquake prediction (Morren, 1983, p. 285). Second, the emergency management approach designates even less attention to the ways in which common people, either as individuals or members of small groups, undertake to cope with these and related problems (Morren, 1983, p. 286). Third, the emergency management approach emphasizes technological solutions. Accompanying this focus is a seemingly misleading picture of the costs, benefits, appropriateness and effectiveness of emergency management techniques (Morren, 1983, p. 286). Fourth, the emergency management approach over-emphasizes earth and atmospheric systems as the immediate initiating agents of disasters, at the expense of examining the socio-cultural (including political and economic) causation factors (Morren, 1983, p. 287). Perhaps in response to these criticisms, a new model for disaster management was developed, the expand-contract model. This alternative model suggests that disaster management should be managed in a parallel series of activities, rather than as a sequence of actions. For example,

immediately after a disaster event, relief and response should be simultaneously applied with recovery and rehabilitation including prevention to mitigate against possible future disasters. This disaster management approach attracted significant attention and support, especially by the South African government (Ministry for Provincial Affairs and Constitutional Development, 1998). The expand-contrast model has also influenced the operational activities currently promoted by the UN Disaster Management Training Programme (UN DMPT).

Once researchers, policy makers and practitioners involved in the hazard sciences, vulnerability sciences and disaster management began to understand that disasters with a natural trigger are not isolated random acts of nature, disasters became increasingly viewed as expected consequences of poor risk management. In other words, disasters with a natural trigger were increasingly seen as the outcome of interconnected social and physical processes that increase the population's vulnerability to natural hazards. The increasing acceptance of this notion prompted Blaikie, et al. (1994) to expand on Sen's (1982) work and investigate the progression of human vulnerability to hazards. The results of their efforts are examined in the following section.

SECTION 2.2: Disaster Pressure and Release Model

In order to explain the relationship between natural hazards and the social processes that generate unsafe conditions, researchers, Blaikie et al. (1994) developed the Pressure and Release model (PAR). See FIGURE 1. According to Blaikie et al. (1994), "the basis for the PAR idea is that a disaster is the intersection of two opposing forces: those processes generating vulnerability on one side, and physical exposure to a hazard on the other" (p. 22). Their model shows in simple diagrammatic terms that vulnerability can be traced back from unsafe conditions, through dynamic pressures, to underlying root causes.

Blaikie et al. (1994) suggest that "root causes" are a set of well-established processes within a society. They are controlled by the state and reflect the distribution of power. The most important root causes are economic, demographic, and political processes (Blaikie et al, 1994).

> ""Dynamic pressures" are processes and activities that 'translate' the effects of root causes into the vulnerability of unsafe conditions... These include reduced access to a resource...through rapid population growth, epidemic disease, rapid urbanization, war,

foreign debt and structural adjustment, export promotion, mining, hydropower development, and deforestation work through the localities" (Blaikie et al., 1994, p. 24).

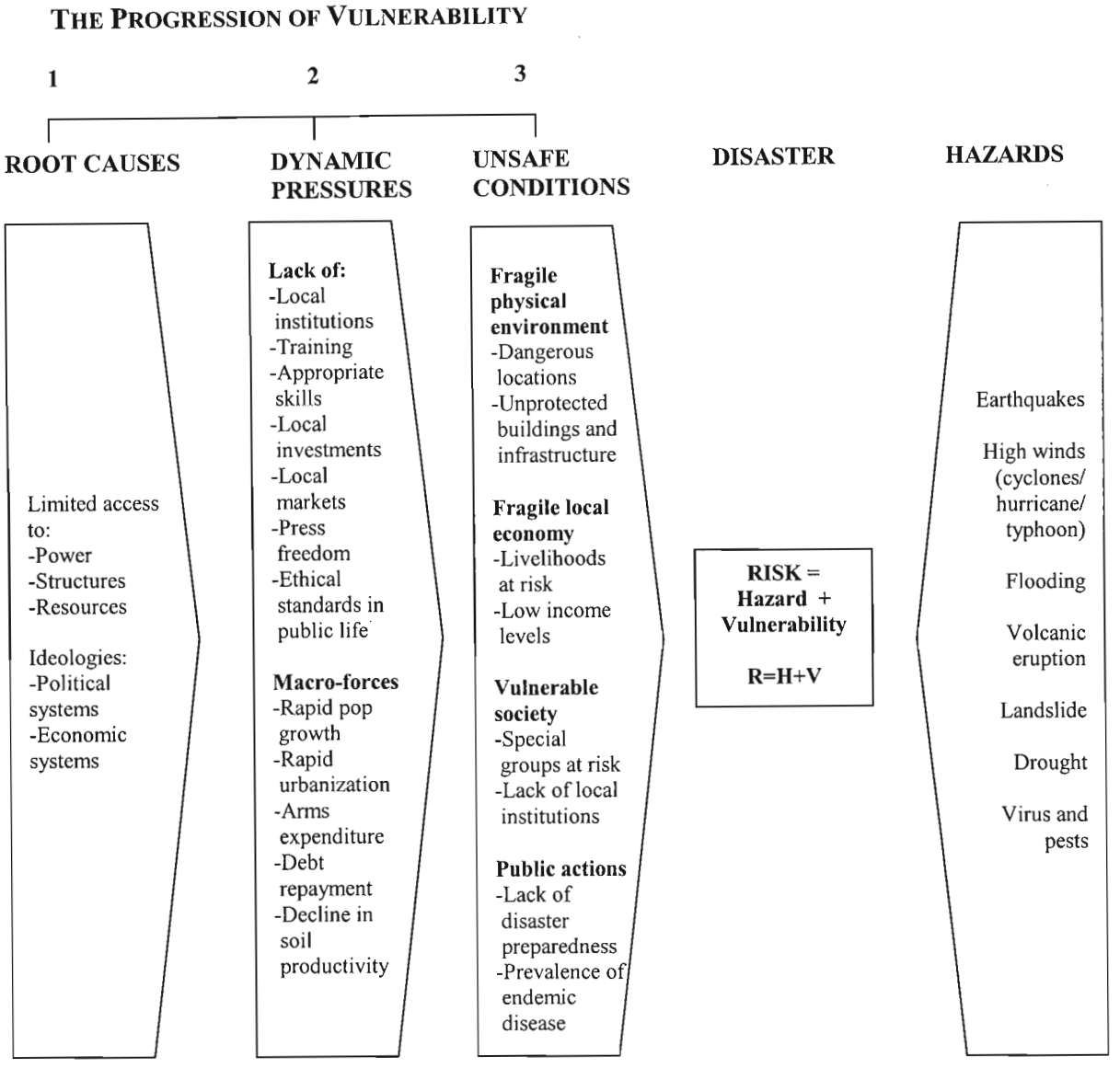

FIGURE 1. Pressures that result in disasters: the progression of vulnerability. Source: Blaikie et al., 1994, p. 23.

"Unsafe conditions" are both the temporal and spatial vulnerabilities of a population. This includes people having to live in dangerous locations, being unable to afford safe buildings, lacking effective protection by the state (such as effective building codes), having to engage in dangerous livelihoods (such as wildlife poaching, or prostitution), or having minimal food entitlements, or entitlements that are prone to rapid disruption (Blaikie et al., 1994, p. 25).

Blaikie et al. (1994) suggest that the chain of explanation linking root causes to unsafe conditions can be further explained by examining the presence of people in hazardous places. They suggest that, often, the presence of these people is the result of broader political economic pressures. This is illustrated in FIGURE 1 where vulnerability that arises from unsafe conditions intersects with a physical hazard (trigger event) to create a disaster, but is itself only explained by analysis of the dynamic processes and root causes that generate the unsafe conditions (Blaikie et al., 1994).

In brief, Blaikie et al.'s (1994) PAR model suggests that disasters are a result of the interaction between a vulnerable population and hazards; "there is no risk if there are hazards but vulnerability is nil, or if there is a vulnerable population but no hazard event" (Blaikie et al., 1994, p. 21). This having been said, in our present reality, we cannot make vulnerability a nil; there will always be some degree of risk. We can, however, lower the vulnerability of a population, and thereby reduce the risk. This approach, to minimize the destructive and disruptive effects of hazards is often called "disaster risk reduction" or "disaster risk management". The following section provides a more detailed examination of disaster risk reduction.

SECTION 2.3: Introduction to Disaster Risk Reduction

The concept of disaster risk reduction was mainstreamed during the UN IDNDR after an approximate thirty-year evolution of the hazard sciences, vulnerability sciences and disaster management, and after the introduction of Blaikie et al.'s (1994) PAR model. The primary difference between these alternative perspectives and disaster risk management is that the disaster risk management approach places more emphasis on dynamic multiple risk factors, including socio-economic vulnerability and (under-) development issues. Experience gained since the 1970s has shown that "by focusing on the socio-economic factors involved, human actions can reduce the vulnerability of societies to natural hazards and related technological and environmental disasters" (United Nations International Strategy for Disaster Reduction, 2002a, p. 17). While the hazard sciences, vulnerability sciences and disaster management currently accept the importance of vulnerability and risk issues, the risk reduction approach places these issues first and foremost. For example, risk reduction ideals stipulate that the health sector is not simply a provider of medical care; the health sector is "the social conscience and advocate for

prevention, mitigation and preparedness measures that reduce the vulnerability of the least privileged groups" (Lechat, 1994, p. 377). Other examples of risk reduction strategies are examined in a following sub-section, which is preceded by definitions of key concepts.

SECTION 2.3.1: Key Concepts

Before the late 1990s, during the predominant practice of the emergency management approach to hazards, disaster authorities and practitioners failed to support a homogeneous use of disaster related terms. According to Alexander (1997), this terminology inconsistency stemmed from the inability of researchers and practitioners to define two key concepts, namely "natural disaster" and "vulnerability" (p. 289). This failure to define disaster related terminology led to inconsistent language usage across publications, which resulted in general confusion. Since the shift to disaster risk reduction, the UN has applied more effort to create and support a common terminology on disaster related issues (United Nations International Strategy for Disaster Reduction, 2002a). If the UN linguistic strategy is successful, it should facilitate the exchange of information between the public, authorities and risk reduction practitioners. Key disaster risk reduction concepts are defined below.

> **Disaster Risk Reduction** - "The systematic development and application of policies, strategies, and practices to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development (United Nations International Strategy for Disaster Reduction, 2002a, p. 25).
>
> **Vulnerability** - "A set of conditions and processes resulting from physical, social, economic and environmental factors, which increase the susceptibility of a community to the impact of hazards" (United Nations International Strategy for Disaster Reduction, 2002a, p.24).
>
> **Risk** - "The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environmentally damaged) resulting from interactions between natural or human induced hazards and

vulnerable/capable conditions. Conventionally, risk is expressed by the equation Risk = Hazards x Vulnerability / Capacity" (United Nations International Strategy for Disaster Reduction, 2002a, p.24).

Prevention - "Activities to provide outright avoidance of the adverse impact of hazards and related environmental, technological and biological disasters" (United Nations International Strategy for Disaster Reduction, 2002a, p.25).

Mitigation - "Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards" (United Nations International Strategy for Disaster Reduction, 2002a, p.25).

Preparedness - "Activities and measures taken in advance to ensure effective response to the impact of disasters, including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location" (United Nations International Strategy for Disaster Reduction, 2002a, p.25).

SECTION 2.3.2: Core Practices

According to the UN ISDR (2002a), "the assessment of the vulnerability of critical facilities, social and economic infrastructure, the use of effective early warning systems, and the application of many different types of scientific, technical, and other skilled abilities are essential features of disaster reduction" (p. 22). This emphasis on vulnerability and risk assessment stems from the risk reduction notion that the social, cultural, economic and political context determines the degree of human vulnerability to hazard events (United Nations International Strategy for Disaster Reduction, 2002a). The ISDR (2002a) admits that there are fundamental practices in disaster risk reduction; however, the priorities, relative emphasis, available resources, and specific means of implementation vary from country to country. As such, the UN argues that it is imperative that every nation conducts vulnerability and risk assessments. The ultimate goal and the justification for these assessments is to understand the degree of risk before developing sustainable communities with a social foundation that provides for health, respects cultural

diversity, is equitable and considers the needs of future generations (United Nations International Strategy for Disaster Reduction, 2002a).

The ISDR (2002a) recognizes that environmental degradation increases the severity of natural hazards. Therefore, in order to achieve sustainable communities, successful disaster risk reduction should enhance environmental quality. Adherence to UN Agenda 21[5] and its emphasis on addressing patterns of development which cause stress to the environment, including poverty and external debt in developing countries, unsustainable patterns of production and consumption, demographic stress and the structures of the international economy is paramount. Disaster risk reduction strategies drawing on the influence of Agenda 21 should be proactive and applied on a continuous basis. This can not be achieved without firm political commitment.

Some challenges that may impede successful disaster risk reduction include "environmentally unsound practices, global environmental change, population growth, urbanization, social injustice, poverty, and short-term economic vision" (United Nations International Strategy for Disaster Reduction, 2002a, p. 27). Poverty is cited as the primary constraint to socio-economic development and therefore disaster risk reduction in Africa (United Nations International Strategy for Disaster Reduction, 2002a). Other critical issues confronting Africa include "matters of health, food insecurity, climatic change, water availability, land degradation and market access" (United Nations International Strategy for Disaster Reduction, 2002a, p. 29). These challenges are a significant obstacle towards the realization of sustainable communities; however, according to the UN ISDR (2002a), strategies that promote political commitment, financial rationale, environmental sensibility and cultural awareness should mitigate the effects of natural hazards (p. 38). The role of mitigation in disaster risk reduction is examined in more detail in the following sub-section.

SECTION 2.3.3: The Role of Mitigation

As previously established, mitigation refers to structural and non-structural measures undertaken to limit the destructive and disruptive effects of hazards (United Nations International Strategy for Disaster Reduction, 2002a, p.25). Thus, mitigation measures decrease the adverse impacts of hazards (Maskey, 1989). As will be demonstrated later in this study, many of the

[5] Agenda 21, a plan of action for addressing both environment and development goals in the 21st century, was adopted at the 1992 UN Conference on Environment and Development (UNCED).

early mitigation strategies promoted by UN IDNDR focus on top-down planning involving expensive prediction systems and attempts to reduce hazards through technical measures that involve heavy capital expenditure. This emphasis addresses the immediate threat of a hazard, but, by itself, does not empower communities to promote the necessary social changes that are required to address the problems specific to the most vulnerable segments of populations (Davis and Myers, 1994). As Ian Davis (1984) points out:

> "Many of the programs treat the symptom and not the cause. The symptoms may be unsafe buildings or vulnerable cropping patterns, but the causes may include all or some of the following: underdevelopment and poverty; control of the land by absentee landlords; corruption; [and] lack of education...[R]isk reduction policies must rely on both technical measures and on political solutions" (qtd. in Maskey, 1989, p. 39).

Therefore, in addition to physical measures, such as reinforcing buildings or raising dykes, mitigation must be used as a developmental activity that focuses on non-physical measures, such as the introduction and enforcement of sensible land-use practices on floodplains, redistribution of wealth, et cetera.

According to Abramovitz (2001), "on average, US 1 Dollar invested in mitigation saves US 7 Dollars in disaster recovery costs" (p. 124). Abramovitz (2001) also points out that some of the most effective mitigation measures are free; she says, for example, healthy and resilient ecosystems protect against coastal storms by absorbing floodwaters (Abramovitz, 2001). Abramovitz (2001) suggests that we should take advantage of these free services rather than destroy them. Blaikie et al. (1994) suggests, "mitigation is not only about altering the hazard side of the PAR diagram, but must be seen in the context of the progression of vulnerability" (p. 222). These compatible notions, to prevent environments from becoming unsafe and to protect the integrity of our natural environments, are excellent examples of non-structural mitigation practices.

The following sub-section provides a more comprehensive examination of common mitigation approaches specific to floods. This focus was chosen in the interest of brevity, and because, "by and large, disasters resulting from floods can be prevented" (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 27). Thus, flood mitigation is considered to be

extremely important, even more so when one considers the fact that, globally, economic losses attributed to natural disasters in 1998 totaled over US 93 billion Dollars, of which roughly one half were caused by floods (The Economist, 3 April 1999, qtd. in UN, 1999a). This flood-specific mitigation focus should provide the reader with an increased understanding of what should be expected from the South African Government officials as they respond to the February 2000 Limpopo floods, which is this dissertation's case study.

SECTION 2.3.4: Structural and Non-Structural Mitigation

Two major paradigms have evolved with regard to what can be done to lessen the impact of floods. The first of these, called structural measures or structural adjustments, are physical measures, such as the construction of flood attenuation dams and river draining works such as levees and urban storm-water systems (Ministry of Provincial Affairs and Constitutional Development, 1998, p. 26). This mitigation approach regards environmental hazards as naturally generated phenomenon requiring structural adjustment, and stresses the application of technological measures to prevent or modify the physical processes involved (Haque & Zaman, 1994). Perhaps unsurprisingly, this mitigation approach was the primary means of flood control during the emergency management era.

In many cases, structural adjustments have been successfully applied for flood mitigation and prevention; two examples are the dams on the Damodar River and West Bengal (Blaikie et al., 1994). However, the sole application of major preventative structural adjustments creates a number of serious problems. First, they can induce "increased risk-taking under the false but convenient assumption of absolute protection" (Alexander, 1997, p. 295). One estimate suggests that, on average, ten significant dam failures occurred somewhere in the World each decade, in addition to near-failures (Blaikie et al., 1994). In 1975, for example, the Grand Teton dam in Idaho (USA) failed, resulting in US 2 billion Dollars worth of damages in a number of downstream towns (Blaikie et al., 1994). Second, structural adjustments are expensive; hence, cost is a concern. In Bangladesh, for example, the construction of embankments along the major rivers required a capital cost of US 10 billion Dollars (Haque & Zamen, 1994). Third, most flood related structural adjustments impede the movement of freshwater fish and cut off their spawning areas, threatening the occupation of fishermen and jeopardizing the diet of the human population (Haque & Zamen, 1994). Fourth, according to the UN ISDR (2002a), "an over-concentration on

technical abilities at the expense of being able to motivate the human aspects that compose the economic, social and political dimensions of societies will continue to provide disappointing results in effective or sustained commitments to risk reduction" (p. 17). As such, structural adjustments should be applied in conjunction with non-physical mitigation measures.

Non-structural mitigation measures, also known as non-structural adjustments, entail a combination of self-protection and social protection by communities, government(s) and non-governmental agencies (NGOs). They are mainly aimed at changing patterns of risk-prone behaviors and do not involve major engineering work. Examples of non-structural adjustments include people's own strategies for dealing with flood hazards, the introduction and enforcement of sensible land-use practices on floodplains, promulgation of dam safety legislation and regulations, furthering flood preparedness and contingency planning, instituting flood warning systems, insurance et cetera (Alexander, 1997). Abramovitz (2001) suggests that traditional engineering (structural adjustment) is important; buildings and bridges can and should be improved to better withstand the stresses of natural hazards. However, instead of relying on structural techniques, we should use the services provided by healthy and resilient ecosystems (non-structural adjustments) (Abramovitz, 2001). "Dunes, barrier islands, mangrove forests, and coastal wetlands are natural shock absorbers that protect against coastal storms...Nature provides these services for free, and we should take advantage of them" (Abramovitz, 2001, p. 138). Strategies to limit the destructive and disruptive effects of hazards do not have to be technologically advanced; mitigation should, however, protect the most vulnerable segments of the population, be sustainable, protect priority sectors, must include firm political support and be incorporated in to specific development plans (Blaikie et al., 1994). The following sub-section further examines the core principles of vulnerability reduction.

SECTION 2.4: Vulnerability Reduction: Core Principles

According to Blaikie et al. (1994), natural disaster mitigation is most effectively applied when it is based on the following five principles[6]. Principle one stresses that government should capitalize on a disaster to initiate or to develop mitigation. Plans should be developed, and where there are political or other obstacles to their implementation, they should be maintained in

[6] The reader should note that these ideas belong to Blaikie et al. (1994), and have not been universally accepted as due course.

readiness for implementation at the appropriate time, such as when a disaster provides the necessary window of opportunity for swift action (Blaikie et al., 1994). Second, governments must focus their attention on the protection of the most vulnerable segments of the population; possible strategies include economic improvements and improved access to resources (Blaikie et al., 1994). The third principle is a stated focus on protecting priority sectors, first addressing the needs of the most vulnerable and the poor. Other priorities may include such considerations as maximizing the number of people to be protected for given resources, lifeline services, food stocks and elements of long-term rather than short-term economic importance (Blaikie et al., 1994). Fourth, mitigation measures must be sustainable over time. Ways to maintain mitigation include an active public awareness program including well documented success stories of risks that were reduced in past disasters, institutionalizing mitigation into normal government planning and policy, and good use of expanded cost-benefit analysis to show the gains from protection (Blaikie et al., 1994). Fifth, mitigation must be incorporated into specific development projects. The aim of such a "hazard impact analysis" would be to verify that new projects will not increase the risks of such hazards as flooding, soil erosion, or disease, and will protect the investment from being damaged or destroyed in a future disaster (Blaikie et al., 1994). Finally, Blaikie et al. (1994) suggest that without firm political support and freedom of expression, risk-reduction measures are more likely to fail than to succeed. Thus, the sixth principle underlying effective disaster mitigation states that political commitment must be maintained.

Most researchers and policy makers understand that "repeated exposure to disasters can lead to a downward spiral of poverty" (United Nations International Strategy for Disaster Reduction, 2002a, p. 28). As such, risk reduction has become integral to understandings of sustainable development (United Nations International Strategy for Disaster Reduction, 2002a). However, as will be demonstrated later in this chapter, the idea that mitigation should be incorporated into development plans was largely ignored within the UN IDNDR's initial framework of action. Over time, the notion of disaster risk reduction became more accepted by the UN, and eventually became the focus of the IDNDR. This shift in focus as well as the other accomplishments of the UN IDNDR are examined throughout the remainder of this chapter.

SECTION 2.5: Activities and Accomplishments of the United Nations International Decade for Natural Disaster Reduction

In 1987, the UN General Assembly designated the 1990s as the IDNDR. They sought, above all, to reduce the loss of life and damage caused by the growing number of disasters with a natural trigger. This section of this dissertation outlines several of the conferences, keynote addresses and publications that contributed to the IDNDR's achievements, beginning with the contribution made by Frank Press, one of the initiators of the IDNDR. This section also describes how the UN IDNDR came to espouse disaster risk reduction.

SECTION 2.5.1: Introduction to the United Nations International Decade for Natural Disaster Reduction

In response to the rising costs of disasters with a natural trigger, Frank Press, the then President of the American National Academy of Sciences, challenged the UN General Assembly with the following question. "Given the demonstrated capabilities of science, and rapid developments in technology, could it not be possible to reduce the loss of life and damage experienced by the growing number of natural disasters?" (qtd. in United Nations, 1999a, p. 24). The UN General Assembly responded to Press' question by designating the 1990s as a decade in which the international community, under the auspices of the UN, would give special attention to fostering international cooperation in the field of disaster reduction (United Nations, 1999b, p. 82).

The Member States of the UN formally proclaimed the IDNDR by UN resolution 44/236 on 22 December 1989. The Annex of UN resolution 44/236 contains the objective for the Decade as well as the recommended framework of action to achieve this objective. According to the document, the IDNDR's objective was to reduce "the loss of life, property damage and social and economic disruption caused by natural disasters" (United Nations, 1989, Annex). The framework of action suggested that in order to achieve this objectives each country must: build national capabilities to mitigate the effects of disasters with a natural trigger; develop guidelines and strategies for applying existing knowledge; foster research to close gaps in knowledge; disseminate information and develop measures to apply technical assistance and technology

transfer, demonstration projects, education and training[7] (United Nations, 1989, Annex). However, according to Varley (1994), the IDNDR's extensive list of recommendations did not require governments to change significantly. As acknowledged by Terry Jeggle, the IDNDR Secretariat, the initiators of the IDNDR implemented the Decade under the bias that sufficient scientific and technical knowledge existed, which, with more extensive application, could save thousands of lives and millions of dollars in losses from natural disasters (United Nations, 1999a). Thus, initially, the IDNDR participating governments were not required to devise innovative disaster risk reduction strategies, or even pursue a national disaster risk reduction framework; governments were simply instructed to assist with the expansion of existing practical measures for effective disaster preparedness and response. Critically, the strategies outlined in UN A/RES/44/236 ignore the root causes, dynamic pressures and unsafe conditions that contribute to risk (Blaikie at al., 1994).

In order to facilitate the requirements outlined in UN A/RES/44/236, the Secretary-General created a Scientific and Technical Committee to develop and make recommendations on disaster related programs (United Nations, 1999b). In 1991, at its inaugural session, the Scientific and Technical Committee proposed three program targets to complement the Decade's overall objective. These were subsequently endorsed by the General Assembly in UN resolution 46/149 (United Nations, 1999b, p. 4). These targets required that by the year 2000, as part of the UN plan to achieve sustainable development, all countries will have in place:

- A comprehensive national hazard risk assessment integrated into development plans;
- Sustained disaster mitigation strategies into the national economic development plan;
- Improved access to effective early warning systems at all levels of responsibility.

The program targets highlighted the notion that the IDNDR was initiated on the premise that disaster risk could be reduced through the expanded use of scientific and technological transfers. Shortly thereafter, the limitations of this reasoning became more apparent. Both realizations occurred after a more astute appreciation of the multiple effects of hazards on modern societies, illustrated by the occurrence of several very costly disasters during the first

[7] See Annex B of this dissertation for a complete list of the UN (1989) IDNDR national policy recommendations.

half of the 1990s (United Nations, 1999b.). Some of these disasters include Hurricane Andrew and the Northridge earthquake in the United States, the Baguio earthquake followed by the Mount Pinatubo volcanic eruption in the Philippines, and several incidents of severe floods in China and throughout other parts of Asia. These disasters, some of the worst in recorded history, reality tested the IDNDR and demonstrated the need for the international community to reduce or minimize vulnerability. Other pressures for an expansion of the IDNDR's focus came from other international development initiatives. For example, the global commitment to sustainable development conveyed by UN Agenda 21 emphasized the notion that sustainable economic growth and development cannot be achieved without taking measures to reduce losses from natural hazards (qtd. in United Nations, 1999c). UN Agenda 21 also proclaimed the UN acceptance of a close link between disasters with a natural trigger, economic development and environmental degradation (United Nations, 1999c) - thereby acknowledging that disasters may be exasperated by human actions. Similarly, Principle 18 of the UNCED stressed the need for the international community to assist states afflicted by natural hazards and other emergencies that are likely to produce sudden harmful effects on the environment (United Nations, 1999c, p. 2). The 1990s Global Conference on the Sustainable Development of Small Island Developing States and the Program of Action for the Least Developed Countries called for priority attention to be given to the most underdeveloped countries (United Nations, 1999c, p. 2). According to Jeggle (qtd. in United Nations, 1999a),

> "The feasibility of disaster reduction began to be accepted as techniques and methods demonstrated their potential. Noting the consequences of growth on the immediate environment on which all societies depend, there has been an emergent need for established prevention strategies to become integrated into national plans for sustainable development" (p. 25).

Thus, very early in the IDNDR, the international community became more aware of socio-economic vulnerability as a contributing factor in the risk = hazard + vulnerability equation (United Nations International Strategy for Disaster Reduction, 2002a; Blaikie et al., 1994). This new importance given to socio-economic vulnerability underlined the need to encourage disaster risk reduction activities, including a greater emphasis of the social sciences in research, policy

development and implementation. These considerations were expressed at the official UN World Conference on Natural Disaster Reduction, convened from 23 - 27 May 1994, in Yokohama, Japan. The following section outlines the proceedings and accomplishments of this conference.

SECTION 2.5.2: The World Conference on Natural Disaster Reduction: The Mid-Term Review

The General Assembly announced the 1994 World Conference on Natural Disaster Reduction in UN resolution 46/149. The objectives of the conference were to: (a) review the accomplishments of the Decade; (b) chart a program of action for the future; (c) exchange information on the implementation of the Decade's programs and policies; and, (d) increase awareness of the importance of disaster reduction policies (United Nations, 1999a, p. 25).

Commentators heralded the Yokohama Conference as a "milestone event and a turning point in the IDNDR process", perhaps, because the Conference formally recognized the limitations of the IDNDR's initial International Framework of Action (United Nations, 1999b, p. 86; United Nations, 1989). Davis and Myers (1994) went as far as to say that Yokohama "relaunched the IDNDR" (p. 371). The UN Member States announced their policy shift within the following policy statement: the Yokohama Strategy and Plan of Action for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation (1994). This document reviewed the Decade's mid-term accomplishments and, most importantly, it outlined specific national recommendations for disaster risk reduction. See Annex C of this dissertation for a complete list of the Yokohama Strategy's national recommendations.

In brief, the revised framework of action was characterized by a new emphasis on the social sciences in research, policy development and implementation (United Nations, 1999b, p. 7). This was a departure from the scientific underpinnings of the Decade's early beginning. Incorporated within this idea was a new focus on public policy; many countries were now required to adopt new legislation and devise national strategies for disaster risk reduction. The new recommendations outlined the necessity of the shift in focus, from emergency preparedness to the reduction of community vulnerability and, therefore, risk. During the early half of the Decade, the importance of the shift was not emphasized (United Nations, 1999b, p. 7). Following the Yokohama Conference, disaster risk reduction has become a significant aspect of the UN

system strategy in support of sustainable development, natural resource protection and sound environmental management (United Nations, 1999b).

In summary, as described by Ailsa Holloway, one of the UN Scientific and Technical Committee members, the most significant development of the Yokohama conference was that it initiated the disaster management evolution from "a very 'hazards' oriented process to the current 'development-oriented' platform" (email communication, 27 May 2002). The following section examines the concluding remarks of the IDNDR.

SECTION 2.5.3: Accomplishments of the International Decade for Natural Disaster Reduction

A summary of the IDNDR's final achievements and recommendations can be found in the final report of the Scientific and Technical Committee (A/54/132/Add.1-E/1999/80/Add.1) and in the IDNDR's concluding report by the Secretary General (A/54/132-E/1999/80) (United Nations, 1999b; United Nations, 1999c). This section provides an overview of the most salient features of each report and thus a synopsis of the concluding remarks of the IDNDR.

Political Commitment

The IDNDR did not generate internationally accepted standards for disaster risk reduction institutions, structures, or legislation. However, the IDNDR stresses that every government has the sovereign responsibility to protect its people, infrastructure and national, social or economic assets from the impact of natural hazards (United Nations, 1999c, p.6; United Nations International Strategy for Disaster Reduction, 2002a, p. 17). This suggestion warrants special attention, as it may seem that developing countries lack the resources to implement effective proactive disaster risk reduction systems. In actuality, research suggests, "it is significantly more cost-effective to design and build a structure to standards that would withstand maximum expected winds or seismic forces in a given location, rather than build to lower standards and suffer the damages" (Organization of American States, 1993, qtd. in United Nations Inter-Agency Secretariat, International Strategy for Disaster Reduction, 2002, p. 33). Abramovitz (2001) seems to agree. As stressed earlier, Abramovitz (2001) notes, "on average, US 1 Dollar invested in mitigation saves US 7 Dollars in disaster recovery costs" (p. 124). Granted, it may seem easier to pay a small amount every month indefinitely than is to invest a

higher sum of money to be recouped with additional savings at a later date. However, as recommended by Blaikie et al. (1994), governments can easily capitalise on a disaster to initiate or develop mitigation practices. For example, during the disaster reconstruction period, instead of reconstructing the roads and bridges in such a way that they might collapse with the occurrence of every significant natural force, governments should invest the relatively minor initial extra cost towards strengthening the infrastructure in order that it may withstand the stresses of natural hazards. Furthermore, as suggested by Abramovitz (2001), nature's engineering techniques can be retained and are much cheaper then most structural strategies. These approaches are in both the affected governments' best interest, as it is more cost effective, and in the populations' best interest, as it may ultimately reduce social and economic losses.

Hazard Assessment

The Scientific and Technical Committee suggested that local and national authorities need to integrate hazard assessments more fully into their overall development plans (United Nations, 1999c, p. 6). Implementation of Local Agenda 21 initiatives should also include hazard assessments (United Nations International Strategy for Disaster Reduction, 2002b). These approaches, which should be rooted in financial subsidiary from either the national or provincial government, involves delegating decisions and implementation tasks to the most appropriate level, beginning at the local level with individuals and households (United Nations, 1999c, p. 6). This suggestion stems from the notion that poverty places people in precarious and unsustainable means of survival that can create a range of hazards that cause disasters, or at least aggravates what may have otherwise been minor calamities (Davis, 1999, qtd. in United Nations, 1999a, p. 87). As such, individual households need to become involved in the hazard assessment process. The Scientific and Technical Committee reported that national governments have been attempting to address this issue since the beginning of the 1990s, but that a greater effort was required from governments, particularly in the context of development planning initiatives (United Nations, 1999c, p. 6).

Vulnerability Assessment

In today's era of globalisation, the world's population is faced with rising vulnerabilities. This is occurring, especially in parts of Africa, as urban areas are experiencing increasing

influxes, higher concentrations of people and increasing prevalence of HIV/AIDS. While the development of improved technical and procedural methods for estimating the degree of vulnerability has coincided with its increased use in the insurance and financial sectors, the Scientific and Technical Committee reported that national governments have yet to capitalise on these means (United Nations, 1999c). The ISDR (2002b) asserts that vulnerability involves more than geographical location and suggests a holistic assessment approach, highlighting gender equality in sustainable development and disaster risk reduction goals. These suggestions are in accordance with Blaikie et al.'s (1994) suggestion that the level human risk involves more than the presence of hazards, it also involves limited access to power, resources, and structures, dynamic pressures and unsafe conditions.

Disaster Mitigation

According to the Scientific and Technical Committee,

> "Since substantial resources in most countries are linked to economic development, it is important that natural disaster mitigation be an integral part of the development process. Failure to adopt such a basic strategy as a foundation for disaster reduction can easily jeopardise economic development itself" (United Nations, 1999c, p. 7).

Following this warning, the Committee argued that, often, large projects and financial policies ignore the development interests of the poorest, most vulnerable segments of the population. In response to this concern, the Committee suggested that governments must consider the needs of the poorer segments of the population. The Committee then listed needs of poorer people such as cost-effective methods and materials to improve housing, as well as affordable hazard insurance. These suggestions are both laudable, if "improved" housing involved hazard and vulnerability assessments, and a conscious effort to minimize the populations progression of vulnerability. Other beneficial disaster mitigation strategies that should have been specifically identified by the Scientific and Technical Committee included identifying and delineating natural resources and restoring or maintaining healthy ecosystems so they can provide disaster mitigation services (Abramovitz, 2001, p. 138).

Early Warning Systems

The UN IDNDR's international conference on early warning systems (Potsdam, Germany, September, 1998) emphasised that effective early warning is a process that involves more than technological instruments to detect, monitor and submit warnings (United Nations, 1999c). Early warning should also include identification of hazards and vulnerabilities, risk assessments, and a collective effort by all sectors to increase people's capacity to respond rapidly and appropriately at the local level (United Nations Strategy for International Disaster Reduction, 2002b). These coordinated activities are critical for early warning to become an essential element of any comprehensive disaster risk reduction strategy (United Nations, 1999c, p. 8). The ISDR argues that early warning and preparedness strategies need to be made more effective (United Nations Strategy for International Disaster Reduction, 2002b). Improving communication flows amongst authorities, disaster managers, communities and individuals is "imperative" (United Nations Strategy for International Disaster Reduction, 2002b, p. 13).

Education and Training Initiatives

Since the shift from emergency management to disaster risk reduction, there is an increased need for the development of human capacity in the multidisciplinary field of disaster management, as national governments are now obligated to give the local level authorities more responsibility than the local authorities had in the past. In order to meet this demand, a number of education and training initiates developed over the course of the IDNDR (United Nations, 1999c). These approaches ranged from practical community-based training initiatives to postgraduate education programs (United Nations, 1999c). It seems there has also been an increase in the number of community risk reduction and hazard awareness programs for threats such as cyclones, hurricanes, tsunamis, earthquakes, wildfires and droughts (United Nations, 1999c, p. 8). In an apparent acknowledgement of these advances, the Scientific and Technical Committee expressed its hope for the continued expansion of high design standards (United Nations, 1999c, p. 8). It is laudable that the Committee's statement regarding the training initiatives acknowledged the excellent work performed by governments and researchers thus far but did not discourage future innovation or efforts. However, a point that the Committee failed to adequately acknowledge and, perhaps, should have emphasised is that the most vulnerable

segments of the population are often the least likely sector to receive comprehensive information and training.

National Committees

> "In General Assembly resolution 44/236, in which the IDNDR was founded, Member States were asked to formulate national disaster mitigation programs; establish national committees or focal points; mobilize support; increase public awareness; pay due attention to health care and related forms of essential social and economic infrastructure; and improve availability of emergency supplies. The formation of multisectorial national committees or focal points were considered to be the best means for realizing these goals at the local level" (United Nations, 1999c, p. 9).

Holloway (May 2002) concedes that the IDNDR's influence into developing countries was extremely limited - especially throughout Africa (personal communication). However, various countries, including Australia and some Latin American countries "really took advantage of the platform to move [their] disaster reduction policy along" (Ailsa Holloway, May 2002, personal communication). The final report of the Scientific and Technical Committee supports Holloway's (May 2002) opinion, in part, by stating that "some [governments] have become a significant force for concentrating and mobilising policy interests and carefully conceived programs...More narrowly focused organisations have not adequately involved the wide range of participation that would have been preferred" (United Nations, 1999c, p. 9). According to the Committee, it seems most countries adopted the progressive disaster risk reduction principles advocated during the IDNDR, and only a few countries continued to focus on the more limited concepts of emergency response (UN, 1999c, p. 9). It should also be noted that over 150 countries established IDNDR national committees (Davis and Myers, 1994). This suggests the IDNDR achieved some of its goals and that the Decade, therefore, had a positive impact.

Initiatives of City Officials and of Local Level Organisations

The Scientific and Technical Committee reported that once local authorities became aware of the purpose of the IDNDR, they demonstrated an increasing willingness to participate in the Decade's activities (United Nations, 1999c). The Committee also reported that the local communities' participation has been an important contributor to the Decade's overall success (United Nations, 1999c). As a final recommendation, the Scientific and Technical Committee suggested that disaster risk reduction should become a central component of many local-level policies, including those that target social vulnerability, urban risk reduction, land use planning, and hazard assessment (United Nations, 1999c, p. 9). This final suggestion demonstrates the IDNDR's, commitment to vulnerability reduction through social empowerment, which is a disaster risk reduction strategy.

SECTION 2.5.4: The Conclusion of the International Decade for Natural Disaster Reduction

The IDNDR concluded in 1999. The final declaration adopted at the IDNDR Programme Forum is, in part, set out below.

> "We, participants in the IDNDR International Programme Forum, ...recommend to the international community and the United Nations that based on the proven success of the functional responsibilities and organizational arrangements during the IDNDR, the international cooperative framework for disaster reduction be maintained and strengthened. This framework should ensure partnership and synergy among all elements of risk management and disaster reduction, and should promote a shift from a mentality of reaction to a culture of prevention" (qtd. in United Nations, 1999b, p. 23).

In brief, the IDNDR's final declaration states that disaster risk reduction should become an essential element of national policies (United Nations, 1999b). The UN Secretary-General seems to agree with the importance of adopting a disaster risk reduction paradigm. In his concluding report, he states that the underlying processes of economic, environmental and social disadvantage often contribute more to the severity of disasters than the specific geophysical calamity (United Nations, 1999b). The Secretary-General further stresses that the processes of risk cannot be separated from the pressing concerns of sustainable development, environmental

protection and social equity (United Nations, 1999b). Perhaps in response to these recommendations, the General Assembly agreed to create the International Strategy for Disaster Reduction (ISDR). The specific aim of the ISDR is to "proceed from the previous emphasis of protection against hazards to the processes involved in the awareness, assessment and management of disaster risks" (United Nations International Strategy for Disaster Reduction, 2002a, p. 19). It seems the IDNDR forum participants, the UN Secretary-General and the UN Members States accept the disaster risk reduction strategy as the most universally appropriate hazard management paradigm.

The following chapter (Chapter 3) demonstrates that the government of South Africa prioritised the implementation of disaster risk reduction methods to minimise the progression of vulnerability. Chapter 3 also summarizes the weaknesses and constraints within South Africa's pre-IDNDR disaster management system, and examines the legislative changes the government pursued, or is pursuing, in order to overcome these deficiencies. Finally, as part of an effort to describe how the South African government responded, or is responding, to its population's vulnerability to risk, Chapter 3 describes the South African government's relief and reconstruction efforts relating to the February 2000 Limpopo floods. This study concludes by summarizing the South African government's rhetorical and applied disaster risk reduction efforts, and by suggesting alternative disaster risk reduction strategies which the government should pursue and the implications that may arise from this fundamental change in philosophy and approach to hazards and disasters.

CHAPTER 3: DISASTER MANAGEMENT IN SOUTH AFRICA

Having outlined the achievements and recommendations of the UN IDNDR, it is now possible to turn to South Africa's application of disaster risk reduction principles. This chapter begins by examining South Africa's rhetorical and legislative response to the IDNDR. It concludes by discussing how these policies are being applied. This chapter reveals that the government of South Africa has legislatively provided an enabling environment for an effective disaster risk reduction system consistent with UN ideals. This chapter also reveals that a significant number of disaster risk reduction developments have occurred in South Africa, but that a greater effort is required from the government. These developments are examined over the remainder of this study.

Section 3.1: South Africa's Rhetorical and Legislative Response to the United Nations International Decade for Natural Disaster Reduction

Preceding the mid-1990s, South Africa predominantly utilized emergency preparedness procedures, involving mainly reactive features, to manage hazards and disaster with a natural trigger. This created a vicious cycle that contributed to greater poverty and increased vulnerability, particularly amongst the most disadvantaged segments of the population (Khandlhela, 2002). Various government departments attempted to improve South Africa's disaster management system; however, these efforts were often performed in a fragmented and uncoordinated manner. According to Stopforth (1999), this led to ineffective conduct, unnecessary duplication, and conflicting legislation (qtd. in United Nations, 1999a, p. 228). Perhaps as a result, specific facets of disaster management, such as mitigation and prevention, were not sufficiently addressed, so the emphasis largely fell on reactive measures (United Nations, 1999a, p. 228).

As has been established in the previous chapter, the Yokohama Strategy altered the focus of the IDNDR from the transfer of information and disaster related technology to an increased emphasis on social, economic and environmental vulnerability (United Nations, 1994). According to George Kilian (16 January 2003), the South African National Disaster Management Centre's Director of Policy and Coordination,

> "the paradigm shift to a more proactive approach to disaster management, as opposed to the then traditional reactionary approach, was welcomed in South Africa...The fresh breeze of this approach was considered as very appropriate and in principle accepted by all in South Africa" (email interview).

Kilian's (16 January 2003) statement is supported by the fact that once the paradigm shift occurred, the UN IDNDR recommendations fell in line with South Africa's national strategy to alleviate the plight of poor communities through poverty reduction, land reform, and service expansion and delivery (Department of Constitutional Development, 1998, p. 5). These developments, combined with internal pressure from the June 1994 Cape Flats floods, prompted the South African Cabinet to resolve how to proceed from the traditional reactive system to a proactive disaster risk reduction approach (Ministry for Provincial Affairs and Constitutional Development, 1998). A Management Committee was established, composed of various members from the Department of Constitutional Development, other state departments, the nine provinces, various NGOs and other relevant stakeholders. Its first act involved the drafting and dissemination of a discussion paper to all stakeholders who had an interest in disaster management. The Committee submitted its conclusions shortly thereafter.

In 1995, in response to the Disaster Management Committee's advice, Cabinet recommended that a formal structure for disaster management be established. Cabinet also suggested that a Natural Disaster Management Committee (NDMC) be formed at the national level, that similar organizations be created at the provincial and municipal levels, and that the Department of Constitutional Affairs, which administers the Civil Protection Act, of 1977, should coordinate all disaster and hazard related initiatives in the interim.

In response to Cabinet's recommendations, the NDMC was established in February 1996. However, very little progress was made to put a functional disaster risk reduction system in place (United Nations, 1999a). Subsequently, in March 1997, Cabinet approved the formation of an Inter-Ministerial Committee for Disaster Management (IMC), with the specific aim of formulating a comprehensive policy for disaster risk reduction. In order to provide an institutional basis for confirmed attention to the subject, Cabinet proposed the construction of a National Disaster Management Centre (NDM Centre) (United Nations, 1999a, p. 228). Finally, in order to demonstrate political commitment to disaster risk reduction, the IMC was tasked with

producing a Green Paper[8] for Cabinet approval before the end of 1997 (Department of Constitutional Development, 1998).

Green Paper on Disaster Management

According to Stopforth (1999), the main objective of the Green Paper was to analyze the problems with South Africa's then current disaster management system and to consider how to proceed to a proactive and preventative approach (qtd. in United Nations, 1999, p. 228). In order to accomplish these aims, a Disaster Management Task Team composed of 33 experts from national departments and various research institutes was established and instructed to solicit the views of all stakeholders involved in disaster management (Ministry of Provincial Affairs and Constitutional Development, 1998, p. vi). The Task Team accomplished this task, and the Green Paper was formally launched on the 11th of February 1998.

The Green Paper highlights two key points. First, the Green Paper states the South African government's support for the IDNDR perspective that disasters with a natural trigger are embedded in complex social, economic and environmental processes. It follows from this first point that the South African government agrees that disaster risk reduction is a multi-disciplinary process, involving the environment, human settlement, human behaviors, health, and public administration considerations (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 11). Second, the Green Paper notes that it is more cost effective to prevent and mitigate disasters than to respond to the hazards after the disasters occur (Ministry for Provincial Affairs and Constitutional Development, 1998). As such, the Green Paper recommends that disaster prevention and preparedness should become an integral part of every national development policy (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 10).

The Green Paper also highlights a number of prevailing weaknesses with South Africa's then current disaster management system. First, and perhaps most importantly, the Green Paper notes, in some cases, a "total lack" of legislative framework governing both the public and private emergency services (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 37). This is a significant concern because disaster risk reduction should be well coordinated and based on firm political commitment; a lack of legislative framework is indicative of a lack of governmental direction and support. Another identified limitation of South

[8] A Green Paper is a government policy document that is at the discussion phase.

Africa's then current disaster management system concerns the system's limited financial support from either the national or provincial governments. It seems the Disaster Relief Fund provided some financial support when a disaster was first declared (Fund-raising Act, No. 107 of 1978). However, for slow onset responses, funding often involved the rescheduling of funds from development projects; this practice is detrimental as it increases the population's vulnerability to natural hazards (Department of Constitutional Development, 1998). The Green Paper's third criticism of South Africa's pre-IDNDR disaster management system concerns the system's fragmentation of responsibility. This point is illustrated by the fact that most of the Green Paper's "points of debate and key questions" ask "who should be the lead agency in the new system" (Ministry for Provincial Affairs and Constitutional Development, 1998). It seems there were very few lead agencies in the former system and no single overseeing department. According to Stopforth (1999), "with such a lack of visibility, training or awareness-raising was improbable" (United Nations, 1999a, p. 228).

The public response to the Green Paper was abundant and very detailed. Some of the more prominent contributors include the Disaster Management Association of Southern Africa, the Bushfire and Emergency Services of Australia, and the South African Local Government Association (SALGA). According to Kilian (16 January 2003), the most significant achievement of the Green Paper's process was the emergence of the public's decision that "the IDNDR recommendations with regard to natural disaster seems to be the correct way of managing disasters. Although disasters, in terms of their magnitude and severity cannot always be prevented, the approach should always be to plan and develop in such a way as to protect the more vulnerable people of society" (email interview). Accordingly, the White Paper[9] on disaster management was written to reflect this favorable bias towards disaster risk reduction; this is demonstrated in the following section.

White Paper on Disaster Management

The White Paper, which defined South Africa's "new thinking" in relation to disaster management, was formally launched on 19 January 1999. In it, policy makers describe the context of disaster risk reduction, both internationally and in South Africa. The Paper begins by

[9] A White Paper is a government policy document that is final and is adopted by both parliament and Cabinet.

making several statements describing the achievements of the IDNDR, including a sentence that acknowledges, verbatim, "largely as a result of the United Nation's [sic.] International Decade for Natural Disaster Reduction, there is increasing pressure for greater investment in prevention and mitigation actions that avert the need for expensive and often repeated assistance" (Department of Constitutional Development, 1998, p. 11). Seemingly as a result of this influence, the White Paper identified seven key disaster risk reduction proposals. These proposals call for an increased emphasis on sustainable development and political commitment. The proposals are as follows:

- "The urgent integration of risk reduction strategies into development initiatives.
- The development of a strategy to reduce the vulnerability of South Africans - especially poor and disadvantaged communities - to disasters.
- The establishment of a National Disaster Management Centre...
- The introduction of a new disaster management funding system...
- The introduction and implementation of a new Disaster Management Act...
- The establishment of a framework to enable communities to be informed, alert and self-reliant and capable of supporting and cooperating with government in disaster prevention and mitigation.
- The establishment of a framework for coordinating and strengthening the current fragmented training and community awareness initiatives" (Department of Constitutional Development, 1998, p. 8).

Following these seven key policy proposals, the White Paper stresses the importance of one of the IDNDR's strategies, that is, for the common - traditional - perception of disasters to change. The White Paper also states that disasters are not rare isolated occurrences. Rather, they are interconnected and increasingly driven by patterns of developmental vulnerability (Department of Constitutional Development, 1998). Having proclaimed the government's new position on the underlying cause of disasters, the White Paper appropriately suggests that the National Government will incorporate risk reduction strategies into all national development-planning policies (Department of Constitutional Development, 1998, p. 14). Other significant proposals include:

- "Developing integrated disaster management strategies that emphasize risk reduction" (Department of Constitutional Development, 1998, p. 14).
- "Adequate allocation of resources to local government to ensure that the most vulnerable communities can depend on reliable disaster management services" (Department of Constitutional Development, 1998, p. 14).
- "Setting and enabling the implementation of minimum building standards, especially for low-cost housing" (Department of Constitutional Development, 1998, p. 14).
- "Ensuring that development of marginal and environmental fragile areas is appropriate and properly planned" (Department of Constitutional Development, 1998, p. 14).

After introducing the above-mentioned proposals, the White Paper acknowledges that there are a number of "shortcomings" that inhibit effective disaster risk reduction in South Africa (Department of Constitutional Development, 1998). These include a lack of: coordination and clear lines of responsibility; an effective disaster risk reduction strategy; government capacity, particularly in rural areas, to implement disaster risk reduction; and, integration of civil society into disaster risk reduction activities (Department of Constitutional Development, 1998). The White Paper proposes that in order to overcome these deficiencies a National Disaster Management Centre (NDM Centre) will be established. This Centre will serve as a disaster information, risk reduction and advice centre to all spheres of government, the private sector, and the broader community. The Centre will also be responsible for the coordination and development of disaster risk reduction strategies, discrete policies and plans, all the while ensuring that the key aspects of disaster risk reduction are embraced and exercised (Department of Constitutional Development, 1998, p. 14).

One of the most important passages in the White Paper suggests that the key to successfully reducing the effects of hazards is to understand the nature of hazards and the factors that cause disasters (Department of Constitutional Development, 1998, p. 19). This passage alludes to the necessity of conducting hazard and risk assessments. Kilian also agrees with the importance of conducting hazard and risk assessments. According to Kilian (16 January 2003),

in order to understand the root causes of disasters in South Africa "risk and vulnerability assessments should...be done in each municipality" (email interview). However, Kilian (16 January 2003) says there is a "general lack of capacity and skills" at the local level, which prevents this from readily occurring (email interview.). In order to overcome this obstacle, the White Paper states that the Centre will enhance the government's capacity to assess vulnerability, determine levels of risk and ensure appropriate mitigation and effective disaster reduction, and that this task will be its principle mandate (Department of Constitutional Development, 1998). Included within this vision is a focus on longer-term risk reduction, including providing input relating to the implementation of minimum standards for low cost housing (Department of Constitutional Development, 1998).

The White Paper suggests that the Centre will, in consultation with the existing structures, audit the current capacity, structures, responsibilities and reporting mechanisms of all the organizations involved in disaster risk reduction and related activities (Department of Constitutional Development, 1998). If this task is undertaken properly, this audit should provide a much-needed definition of the various functions and responsibilities of each of the numerous institutions involved in disaster risk reduction.

In order to fulfill all of its aforementioned responsibilities, the White Paper claims that the Centre will facilitate disaster risk reduction training and promote community awareness of the benefits of disaster risk reduction. A significant problem relating to this and the White Paper's other proposals relates to the need for adequate funding. The White Paper acknowledges this concern, and asserts that there will be several changes to the then current disaster management financial system. According to the White Paper, perhaps the largest problem is that there is no incentive for departments to invest the initial extra cost it takes to prevent and mitigate disasters. While the Paper does not explain how the government expects to address this concern, the Paper does acknowledge that the problem must be reviewed and a solution must be developed. An additional problem relating to finance is that, historically, the Disaster Relief Fund had been slow to provide financial assistance to victims and relief organizations. In order to hasten the release of relief funds, the White Paper proposes that government agencies will be given special powers to deviate from the usual tender procedures, if they can justify why it is necessary to do so. The Paper claims that this should prevent delays in providing services and equipment to hazard affected areas and may minimize social and economic losses. Other

considerations that the White Paper suggests involve insurance incentives. The Paper then identifies small-scale farmers as a key group whose insurance needs require consideration. The White Paper did not recommend whether the government should provide the insurance itself, or whether it expects the private sector to do so, but the Paper suggests that the government will explore the possibility of insurance options.

Disaster Management Bill

In January 2000, the Minister of Provincial and Local Government published the Disaster Management Bill, 2000 for public comment. In June 2001, the Bill was approved for submission to Parliament. This led to the explanatory summary of the Bill in August 2001. In October 2001, the Minister of Provincial and Local Government formally requested that the Financial and Fiscal Commission (FFC) provide an assessment of the financial implications of the Disaster Management Bill. Perhaps in response to the FFC's conclusions, the Bill was amended and reintroduced in May 2002 as B-21-2002 and in March 2003 as Government Gazette No. 23245.

The objective of Bill-21-2002 is to provide "disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery" (Minister of Provincial and Local Government, 2002). The most important provisions of Bill-21 are contained within the section devoted to the prevention and mitigation duties and powers of the National Centre. This section states that the National Centre must, to the extent that it has the capacity to do so, give guidance to organs of state, the private sector, NGOs, communities and individuals to determine levels of risk, assess the vulnerability of communities to potential disasters and increase the capacity of communities to deal with disasters (Minister for Provincial and Local Government, 2002, p. 10). This proclamation confirms the South African government's new position on disaster management as one that emphasizes risk reduction principles. This is a profound shift from the emergency management perspective the government held prior to the mid-1990s.

The FFC Assessment of the Disaster Management Bill (2002) highlights a potential problem with the Disaster Management Bill of 2001, a problem which seems to persist in Bill-21. The assessment reports that there is no dedicated funding mechanism for prevention/mitigation of disasters. According to the assessment, "the Bill introduces incentives

for engaging in mitigation efforts, such as the provision that financial assistance will take account of the extent to which a jurisdiction instituted prevention and mitigation measures (Section 56)" (Financial and Fiscal Commission, 2002, p. 4). However, this statement suggests that districts and local municipalities can only apply for financial assistance for disaster prevention and mitigation during phases of emergency response and post-disaster recovery. Furthermore, the South African Constitution specifies that disaster management is a concurrent National and Provincial competency, but not a local competency. As such, municipalities are not legally obligated to perform disaster management functions, with the exception of fire services. As Bill-21 is currently written, poorer provinces, such as Limpopo who in 2000 spent over 85 percent of the provincial budget on education, health and welfare services, may be forced to wait until a disaster occurs before implementing prevention and mitigation strategies, due to a lack of funds. Second, the municipalities and districts, who are also under-funded, are not legally obligated to perform disaster management tasks and, therefore, may not implement the Disaster Management Act. This problematic situation is not in accordance with risk reduction ideals.

Disaster Management Act

The President signed the Disaster Management Act on 30 December 2002. The objective of the Disaster Management Act is as follows:

> "To provide for –
>
> - an integrated and coordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery;
> - the establishment of national, provincial and municipal disaster management centres;
> - disaster management volunteers;
> - matters incidental thereto" (The Presidency, 2003, p. 1).

The implementation of the Act, which will not occur until the completion of the Act's Framework, requires that several changes be made to South Africa's existing legislation. This new legislation nullifies, for example, both the Civil Protection Act, 1977, and the Fund Raising Act, 1978, the two pieces of legislation that, historically, managed hazards and disasters. While it

seems the Civil Protection Act and the Fund Raising Act did not provide an adequate or comprehensive framework for dealing with hazards and disasters in a holistic or proactive manner, it is unclear whether the Disaster Management Act will be applied more effectively. However, the Disaster Management Act is an improvement in two major respects. First, the previous legislation did not provide a clear delineation of authority and process for the declaration of a "state of disaster" (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 55). The new legislation identifies the NDM Centre as the ultimate responsibility in the event of a disaster, with a Chief Executive Officer acting under a Political Head of the Command Centre (a Minister) who is responsible to Cabinet and the public. In the event of a disaster, the Minister may declare a disaster, but the national executive is primarily responsible for the coordination and management of disasters and impending disasters. This new framework is much more comprehensive than in the previous legislation. The second policy improvement concerns the funding of disaster response. Under the previous legislation, in the event of a disaster, fund raising and the provision of financial disaster relief to victims could not be undertaken within the framework of the Civil Protection legislation. It had to be addressed under a separate Act, the Fund Raising Act (Act No. 107 of 1978) (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 55). This caused unnecessary confusion, which often hindered the relief process. Under the new Disaster Management Act, the funding of post-disaster recovery and rehabilitation is clearly explained in Section 56 and 57. This should hasten the transfer of funds to the victims of disasters and emergency relief organizations.

A potential problem with the Disaster Management Act is that the Act, in its current form, does not seem to outline funding mechanisms for mitigation and prevention. This may be a significant concern because, as the legislation is written, it seems to place the cost of prevention and mitigation on the local municipalities and districts, which may not have adequate funds for these strategies. It can also be argued that the districts and municipalities are not legally obligated to implement the Act. As such, in it current form, the Disaster Management Act seems to ignore the needs of the poorest and most vulnerable provinces, like Limpopo, who in the year 2000 spent over 85 percent of its provincial budget on social services. Unfortunately, Kilian commented very little on this issue; Kilian (19 September 2003) says, "With regard to your emails and question if disaster management is an "unfunded mandate" as far as municipalities are concerned, I would refrain myself from commenting on this matter as this is an issue that

could be subject to many different opinions" (email interview). In his response, Kilian's (19 September 2003) may be referring to the Disaster Management Act's Section 56, which specifies that funding for post-disaster recovery and rehabilitation may access funding from national government if, among other stipulations, "any prevention and mitigation measures were taken" (p. 52). It seems that provinces can access national funds for prevention and mitigation, but only during phases of post-disaster recovery and only if prevention and mitigation strategies were taken prior to the disaster. If this is case, if "post-disaster" is the only circumstance in which municipalities are eligible for funds, than the Disaster Management Act does not adhere to disaster risk reduction ideals. It is hoped that the Disaster Management Act's Framework remedies the prevention and mitigation funding ambiguity and that funds are made available to all especially vulnerable municipalities.

As previously mentioned, the Disaster Management Act has not been implemented. However, some developments have occurred in anticipation of implementation of the Act. According to Kilian (16 January 2003), some of these developments include:

- "The establishment of the NDM Centre to cope with potential and real disasters such as the Y2K phenomenon and the 1999/2000 floods...
- The publishing and approval of the Disaster Management Bill to be promulgated as the Disaster Management Act.
- The establishing of a political disaster management forum as well as institutional structures in the national and provincial spheres of government" (email interview).

It seems the government of South Africa is on course to legislatively provide an enabling environment for a comprehensive disaster risk reduction system that focuses on reducing the risk of disasters by mitigating their severity through development plans, programs and initiatives. As previously established, the Disaster Management Act's section detailing funding for prevention and mitigation strategies is ambiguous and may be subject to abuse. This having been said, the Disaster Management Act is a marked improvement from how hazards and disasters were dealt under the previous legislation. However, at this stage of analysis, it is not clear how these policies will be or are being applied. Thus, to fully understand the influence of the IDNDR on the South African government's current disaster risk reduction efforts, the following section

examines the impacts of the February 2000 Limpopo floods, and how the South African Government responded, or is responding, to those events.

SECTION 3.2: South Africa's Disaster Management System in Practice: The February 2000 Limpopo Floods

Between December and March 2000, during a global La Niña climatic event, a series of tropical storms and cyclones buffeted from the Indian Ocean into parts of southern Africa. The storms caused heavy rains and several waves of flooding in Madagascar, Mozambique, Zimbabwe, Botswana, Swaziland, and in parts of South Africa, including Mpumalanga, KwaZulu-Natal, Limpopo and Gauteng (Health System Trust, 2000). Limpopo experienced the highest level of destruction in South Africa, followed by Mpumalanga (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000).

Limpopo's flood disaster was triggered in early February when the rains increased to torrential levels; during this month alone, 1,242mm of rain fell on Thohoyandou, the major urban and administrative center of the northern region of the province (Health System Trust, 2000). The intensity of this rainfall can be illustrated by the fact that this area of South Africa is classified as a Lowveld climatic region, which is characterized by an average *annual* rainfall below 400mm, and by the fact that 433mm of rain fell on Thohoyandou on a single day (Health System Trust, 2000). On the 20th of February, only two weeks following the Limpopo's four consecutive days of torrential rains, Cyclone Leon-Eline passed through southern Africa, bringing additional heavy rains and winds to already disaster affected areas. This phenomenon exasperated the problems experienced by Limpopo's population.

The effect of the February 2000 winds, heavy rains and floods were extremely severe, but these are not the only factors that contributed to the Limpopo disaster. Other contributing factors include, first, that the predominantly rural province of Limpopo (89 percent rural) is the third poorest province in South Africa with an unemployment rate of 47 percent (Statistics South Africa, 1999). The headcount index of the province is 0.38 (Statistics South Africa, 2000); this suggests that approximately two-fifth of all households in the province live below the poverty line (Statistics South Africa, 2000). Studies performed by the United Nations Development Programme (UNDP) suggest that the province's Human Development Index (HDI) in 2000 is

0.47, which ranks the province's development index alongside countries such as Zimbabwe and Lesotho. Other statistics suggest that 62 percent of black African households and 69.3 percent of black African individuals in the Province are impoverished (May, 2000). According to Lavell (1994) poverty is the single most important factor characterizing sectors of the population as vulnerable to the adverse effects of natural hazards (qtd. in Khandlhela, 2002); if Lavell's supposition is correct, Limpopo's socio-economic statistics clearly suggest that a specific group of individuals in the province are especially vulnerable to the adverse effects of hazards.

Another factor that contributed to the February 2000 Limpopo disaster is South Africa's flood-management program. This program's framework specifies that once the water level in South African dams rise to a certain level authorities must open the floodgates to prevent the dams from bursting (Office of the Premier of the Northern Province, 2000). This action resulted in the flooding of a number of down-stream rivers in Limpopo in February 2000 (Office of the Premier of the Northern Province, 2000). In many cases, river channels expanded to two to three times their pre-flood width and rivers like the Letaba, Limpopo and Crocodile burst their banks and flooded their surrounding area (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000; Napier and Rubin, 2002). The effect of the rain and rushing water was further intensified by the destruction of South Africa's wetlands and grasslands, both naturally occurring flood-mitigation structures. The wetlands channel the waters in different directions so the effect of the rushing water is decreased, while the grasslands increase infiltration and absorption (Napier and Rubin, 2002, p. 10). Unfortunately in South Africa, an estimated 50 percent of the wetland areas have been destroyed and the grasslands have been overgrazed and are subject to soil erosion processes (Napier and Rubin, 2002). According to Napier and Rubin (2002), "the result was that the upper reaches of the rivers were incapable of absorbing the excess water and the disaster floods of 2000 and 2001 ensued" (p. 10-11).

The Estimated Damages

A reported 107 people lost their lives during the February 2000 Limpopo floods, and 43,773 mud huts collapsed, leaving approximately 46,010 people homeless (Maswanganyi, 2000). According to the former Office of the Premier of the then Northern Province (now Limpopo) (2000), the heavy rains and floods also triggered significant damages to the road and

bridge network. According to the Provincial Office, an estimated 400 bridges and other types of drainage structures were either destroyed or severely damaged (Office of the Premier of the Northern Province, 2000, p. 3). Other estimates suggest that "180 kilometers of the Province's 6 thousand kilometers of tar roads and approximately ten thousand kilometers of the Province's 15 thousand kilometers of gravel roads were damaged to the extent that they needed to be rebuilt" (Office of the Premier of the Northern Province, 2000, p. 3). The floods also triggered significant damages to schools, border posts, hospitals, and both public and private industry. See FIGURE 2 for a synopsis of the estimated flood damage to public infrastructure in Limpopo.

SECTOR	ESTIMATED QUANTIFICATION OF DAMAGE
Provincial roads, bridges, and drainage structure	R1 350 million
Local roads, bridges, and drainage structures	R400 million
Water supply systems	R147 million
Schools	R84 million
Public Facilities	
• Provincial game reserves	R10 million
• Provincial farms	R5 million
• Border posts	R5 million
Housing	20, 000 homeless families
TOTAL	**Approximately R2.355 billion**

FIGURE 2. Estimated flood damage to public infrastructure in Limpopo (Office of the Premier of the Northern Province, 2000, p. 3).

In summary, the Premier of Limpopo, Ngoako Ramatlhodi, estimates that it may cost R2.355 billion to repair the flood damage to roads, bridges, hydro systems, schools, and other public properties (Office of the Premier of the Northern Province, 2000). These costs are in addition to the overwhelming 107 lives lost and other private losses that left an estimated 46,010 people homeless and 120,000 families short of food (Maswanganyi, 2000; United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for South Africa, 28 March 2000). It is clear that the February 2000 Limpopo floods triggered considerable financial, social and physical losses. Given this fact, there is a discerning lack of

formal documentation that describes the government's actual response to the floods[10]. In order to achieve the aims of this study, it was necessary to conduct interviews with George Kilian, from the NDM Centre, Baldwin Ramasobane, from the Office of the Premier of the Limpopo Province and Philip Mulaudzi from the Disaster Management Centre in Limpopo. The absence of written documentation highlights a general lack of review process that the government should be undertaking as a matter of due course. This problem is exemplified by the fact that the only formal disaster review released by the Government concerns the response of the Limpopo Department of Health and Welfare. Even the media largely ignored the first weeks of the flood. It was not until TV pictures showed helicopter rescues from trees and rooftops, and the rescue of a woman and her baby born in a tree in Mozambique, that people became interested in the event. Even then, these pictures depict a distorted view of the total situation. According to the authors of the South African Health Review (2000), "in most places the destruction of infrastructure and basic services was the real threat" (p. 6). This supposition can be validated by statistics which suggest that the floods resulted in a food shortage to 120,000 people largely because the damage to road and bridge networks prevented farmers from salvaging and distributing their crops (United States Agency for International Development, 24 March 2000). The population also became more vulnerable to cholera, malaria and dysentery infection, because of the damages to the hydrological system (Health Systems Trust, 2000). Worse still, the majority of the reported deaths can be directly attributed to the collapsing of residential walls (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000). These incidents highlight the notion that the poor are at an increased risk to the adverse effects of hazards. Unless the South African government documents the nature and severity of its hazard and disaster problems the government cannot begin to expand its capacity to minimize the population's progression of vulnerability to risk.

South Africa's disaster prevention and mitigation shortcomings are demonstrated very clearly in the government's response to the February 2000 Limpopo floods. While highlighting these inadequacies, the following section examines the government's relief and reconstruction efforts.

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[10] This lack of documentation is also a failure to heed the IDNDR recommendation which suggests that all governments should "document all disasters" (United Nations, 1994, p. 11).

The South African Government's Response to the February 2000 Limpopo Floods

As part of an effort to examine how the South African government responded or is responding to the February 2000 Limpopo floods, this section is divided into four subsections. The four subsections individually examine the following topics, disaster preparedness, relayed disaster warning, assembly and coordination of emergency response teams, and providing services. These four "stages of relief" were chosen because they cover all aspects of the UN Office for the Coordination of Humanitarian Affairs (OCHA) Disaster Response Branch's (DRB) "relief coordination services", as well as the UN IDNDR Scientific and Technical Committee's "primary areas of disaster reduction" (Canadian Red Cross, 1996, p. 12-13; United Nations Office for the Coordination of Humanitarian Affairs, 2 June 2003; United Nations, 1999c, p. 1). Chapter 4 immediately succeeds the four stages of analysis and finalizes the study by summarizing the South Africa government's rhetorical and applied efforts relating to its shift, from emergency management to disaster risk reduction, and by discussing whether the government is adhering to the shift and what more should have been done.

Disaster Preparedness

The IDNDR's Scientific and Technical Committee suggests that disaster preparedness involves the following efforts: policy commitment; hazard assessment; vulnerability and risk assessment; disaster mitigation; development of early warning systems; creation of education and training initiatives; establishment of national committees; and the implementation of initiatives involving city officials and local level organizations (United Nations, 1999c, p. 6-9). This sub-section of this study examines the events that occurred before, during and after the February 2000 Limpopo floods that may suggest the government met, or failed to meet, these preparedness requirements. This section concludes by suggesting, during February 2000, South Africa was, perhaps, not as prepared for a major natural hazard as it should have been.

The UN IDNDR's Scientific and Technical Committee claims that one of the most essential elements of disaster preparedness is the development and implementation of appropriate policies and disaster response plans (United Nations, 1999c). The forthcoming implementation of the 2002 Disaster Management Act should improve South Africa's disaster risk reduction policy deficit. According to the NDM Centre's Director of Policy and Coordination:

"In terms of the new Disaster Management Act, 57 of 2002, each sphere of government has been given specific responsibilities with strong emphasis on the elements of prevention, preparedness and mitigation (risk-reduction). Each municipality is also required to compile a disaster management plan which, in terms of section 26(g) of the Municipal Systems Act, 32 of 2000, must form part of its overall Integrated Development Plan. In order to have this realized National Government will in due course issue the necessary guidelines by means of a national framework as well as Regulations in terms of the Act, to provinces and municipalities" (Kilian, email interview, 4 June 2003).

In February 2000, in absence of the promulgation of the Disaster Management Act, the South African government seems to have achieved very little by way of developing and establishing flood preparedness plans. Some early attempts were made to devise policy plans. For example, there are statutory requirements for owners of new category II and III dams to initiate emergency preparedness plans (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 27). However, these requirements do not extend to existing dams (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 27). Other plans are often performed in a fragmented and uncoordinated manner. For example, according to Vogel (N.D.), "in 1989...the Department of Water Affairs and Forestry initiated plans to prepare a draft revised National Flood Management Policy" (South African IDNDR Committee, qtd. in Vogel, N.D., p. 12). Among other concerns, the following two issues were to be addressed, "improved flood preparedness and flood warning" (South African IDNDR Committee, qtd. in Vogel, N.D., p. 12). "The development of this document lost momentum and was never completed" (Alexander, personal communication, 1997, qtd. in Vogel, N.D., p. 12). Following this incident, concerns about a lack of legislative support began to increase. According to Fuchs (1997), policy criticisms became especially abundant during the National Department of Agriculture's process of redrafting the White Paper on Agriculture to incorporate the new disaster risk reduction initiatives (qtd. in Vogel, N.D.). It seems policy makers received almost no support from the Executive Committee of the NDM Centre in terms of policy formation regarding the new risk reduction initiatives (Vogel, N.D.). Baldwin Romasobane, the Office of the Premier of the Limpopo Province's "contact person" for the Plan for Reconstruction Flood-Damaged

Infrastructure in the Northern Province (2000), provides further support to this lack of policy claim. He states that, during the Limpopo February 2000 floods "we [the government] were working in the dark. We never had a disaster management system in place. People tried to cross-rivers and people died, because we did not have a disaster management system in place" (Ramasobane, telephonic interview, 22 January 2003). Official records admit that it took weeks for government officials to visit the isolated populations of the Venda Valleys during the February 2000 Limpopo floods because, according to the South African Health Review 2000, "the officials could not reach them" (p. 6). From that statement read "the officials could not assist the Venda Valleys population because the Valleys were too flooded; thus, the government left the population to its own devices". The government therefore failed to attend to the needs of the most vulnerable and the poor, as advised by Blaikie et al. (1994). The South African National Defence Force (SANDF) appears to be more organized than other departments. According to Philip Mulaudzi (4 June 2003), the Deputy Director / Manager of the Disaster Management Centre in Limpopo, "the SANDF has contingency plans for the Province... They are linked and have assigned responsibilities. They report to the Provincial Disaster Committee, where all stakeholders are represented" (telephonic interview, 4 June 2003). Kilian expands on Mulaudzi's (4 June 2003) statement by saying, "the National Disaster Management Centre, in case of a disaster, is in close cooperation with the SANDF. Early warning systems are timeously activated and if necessary, helicopters are dispatched to the areas concerned" (email interview, 4 June 2003. These statements suggest that the military has developed plans for disaster response. Perhaps as a result, "during the February 2000 floods the SANDF was...commended worldwide for its efficient and effective conduct" (Kilian, 4 June 2003, email interview). However, Mulaudzi admits that before the February 2000 floods "there were gaps" in Limpopo's overall disaster management policy (telephonic interview, 4 June 2003). According to Mulaudzi, "the problem was there was no major disaster before February 2000. We did not have the experience or know what to prepare for. We lacked coordination... Some plans were not in place before...We are getting better, but not what we expected...60 - 70 percent now operational" (telephonic interview, 4 June 20003). This latter statement suggests that the Limpopo government was not as prepared for a major hazard as it should have been. This having been said, the implementation of the Disaster Management Act may improve Limpopo's flood preparedness.

Important as it is for legislators to devise and implement disaster preparedness policy and plans, it is also important for government officials and the population to understand their hazard and vulnerability patterns, and levels of disaster risk. As specified by the UN ISDR (2002a), the assessment of vulnerability and risk are essential features of disaster risk reduction (p. 22). The 2001 South African Disaster Management Act is written to reflect the national government's acceptance of this notion; it specifies, for example, that local level authorities must determine "levels of risk and assess "the vulnerability of communities and households to disasters that may occur" (The Presidency, 2003, p. 48). However, hazard and vulnerability assessments have not been performed in anticipation of the implementation of the Act (Kilian, email interview, 16 January 2003). In addition to funding limitations, human capacity issues may further delay the completion of the assessments. According to Kilian (16 January 2003), one of "the greatest limitations of the South African disaster management system…' is a '…general lack of capacity and skills to effectively deal with and promote disaster management" (email interview). As such, according to Kilian (16 January 2003), "the most significant challenges in implementing the Disaster Management Act would be for each municipality to undertake its own risk and vulnerability assessment and to complete its disaster management plan accordingly" (email interview). These statements suggest that it may be a considerable period of time before each municipality has conducted is own hazard and risk assessment. This is problematic because without this information the government can not be sure that it is correctly targeting the conditions and processes that increase the susceptibility of the population to the adverse impacts of hazards.

In addition to not performing hazard, vulnerability and risk assessments, it seems there had not been adequate disaster mitigation in Limpopo prior to the February 2000 floods. For example, 43,773 mud huts collapsed, leaving 46,010 people homeless, thereby suggesting that a significant portion of the Limpopo population lived in fragile physical environments (Maswanganyi, 2000). The floods also reveal that the Limpopo's public infrastructure was especially susceptible to the adverse effects of hazards. According to Ramasobane (22 January 2003), "right now, we do not even know where the roads and bridges are. So, disaster risk reduction currently involves a road management system. We are information gathering, so that long-term maintenance and repair can be properly managed" (telephonic interview). While it may seem absurd for the road and bridge network to be unaccounted for by the responsible

authority, Ramasobane's (22 January 2003) statement highlights the apparent lack of disaster mitigation performed in Limpopo prior to the February 2000 floods.

An additional issue relating to disaster preparedness involves the securing of resources. According to the UN, these "secured resources" should include both the basic survival items, such as tents, generators, basic tools, water storage and purification equipment, and funding for relief and reconstruction (United Nations Office for the Coordination of Humanitarian Affairs, 2 June 2003). This suggestion does not necessarily mean that governments should maintain warehouses full of relief supplies, at public expense. A more economic and therefore a more viable option is to establish procurement systems, whereby arrangements are made with private industry to supply emergency relief supplies during periods of increased need. The establishment of these procurement systems fulfills the UN recommendation to secure basic survival items, which may mitigate the adverse effects of a hazard.

In order to assess the relief supply readiness of Limpopo, this researcher directed the following question to Kilian: "what disaster preparedness supplies are being stored in Limpopo, at what quantity and where? Are these supplies sufficient to meet the occurrence of a hazard of a similar degree of severity as the February 2000 floods?" (email interview, 25 March 2003). Kilian (25 March 2003) responded by saying, "depending on the present circumstances'…'[the supply] may change from time to time" (email interview). Mulaudzi was later asked the same question. Mulaudzi (4 June 2003) responded by saying, before February 2000 "we used to store tents in few numbers" (telephonic interview).

An examination of the government's response to the February 2000 floods sheds more light on the issue of Limpopo's relief supply readiness, including the emergency relief supply procurement system. Judging the government's response, it seems that provincial officials are able to quickly distribute food parcels. By the 23rd of February, the then Limpopo Province Premier Ngoako Ramatlhodi reportedly said that the Province had distributed 5,300 food parcels, each containing enough provisions to feed one family for two weeks (Business Day, 23 February 2000). Mulaudzi (4 June 2003) further explains that the emergency food distribution system operates under conditions that "[local] businesses make food boxes" (telephonic interview). Once the boxes are completed, the SANDF and the Department of Health and Welfare are tasked with distributing the boxes (telephonic interview, 4 June 2003). This procurement system is laudable as it empowers the local community. Unfortunately, this positive revelation is

overshadowed by the fact that other supplies had to be ordered in or purchased at the onset of the floods. For example, in the early stages of relief, the Joint Operation Centre had to order tents and the Health and Welfare Department was instructed to purchase water purification supplies and insect repellents (Business Day, 23 February 2000). This ordering and purchasing response demonstrates that the government can deliver emergency relief supplies during periods of crisis. This abides by the UN recommendation to secure appropriate relief supplies in disaster-prone areas[11] (United Nations, 1989, Annex).

As previously established, the preparatory measure of securing resources includes allotting adequate funds for relief and reconstruction. In recognition of the importance of this notion, the Disaster Management Act was drafted to include an entire chapter devoted to the securing of funds for relief and reconstruction. In another positive revelation, Sydney Mufamadi, the Minister for Provincial and Local Government, revealed that the national emergency relief fund had been established in the year 2000 - before the occurrence of the February floods (Business Day, 14 March 2000). However, during the February 2000 floods, South Africa's public works minister Stella Sigcau claimed, "finding money for reconstructing flood-damaged infrastructure was...an immense problem" (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Network for Southern Africa, 13 March 2000). This statement followed the then Provincial Member of Executive Committee (MEC) for Public Works Collin Chabane's earlier statement describing the effects of the recent floods on the road and bridge networks, and the actions taken by the Department of Public Works to reconstruct the damaged public infrastructure. He explained that the Province had requested financial assistance from the National Government in order to carry out the necessary repairs, but that the National Government was still "assessing the Province's report", and had not released the requested funds (Chabane, 7 March 2000). Ntatho Motlana, a businessman and a trustee of the national emergency relief fund, expanded on Mufamadi's statement by saying that the areas affected by the floods would soon be visited by the trustees to establish which areas should receive priority assistance (Business Day, 14 March 2000). On May 17th, three days following Motlana's announcement, the national Finance Minister, Trevor Manuel, declared that the national government was prepared to release R300 million for relief efforts to be distributed across the

[11] As previously mentioned, Limpopo's most flood-damaged area was prone to flooding (Cathy Oelofse, personal communication, May 2002).

four provinces that experienced flood damage (Business Day, 17 May 2000). The money was then distributed between Limpopo, Mpumalanga, the Eastern Cape and KwaZulu-Natal, all of which experienced some degree of flood damage (Jacobson, 18 February 2001). From this initial stipend, Limpopo was allocated R93 million (Business Day, 17 May 2000). "Red tape" and "bureaucracy" meant that the national government did not release the funds until September, seven months following the beginning of the floods (Jackson, 18 February 2001). Worse still, the second tranche of funding (R855 million) was not released until mid-February 2001 (Jackson, 18 February 2001). According to Collin Chibane (2001), "in a disaster that is very long time [to wait for funding]" (qtd. in Jackson, 18 February 2001). Others went further to say that this lack of commitment for reconstruction funding will "setback...economic development, resulting in further poverty, malnutrition, and disease" (Health Systems Trust, 2000, p. 7). However harsh the criticisms are, they are overshadowed by Manuel's more recent statement that the funds used for flood damage reconstruction were originally intended to address educational backlogs, and that they did not come from the national emergency relief fund (Jackson, 18 February 2001). These findings suggest that the emergency relief budget was insufficient to meet the demands of the February 2000 Limpopo floods. It seems that South Africa is, perhaps, not as prepared for a major hazard as it should be.

The UN IDNDR's Scientific and Technical Committee claims that early warning systems are "crucial to reducing losses" (United Nations, 1999c, p. p. 8). As such, an international conference focusing on the issue of early warning was conducted during the IDNDR (United Nations, 1999c). The conference emphasised that effective early warning is a process that involves identification of hazards and vulnerabilities, risk assessments, a collective effort by all sectors to increase people's capacity to respond rapidly and appropriately, as well as technological instruments to detect, monitor and submit warnings (United Nations, 1999c; United Nations Strategy for International Disaster Reduction, 2002b). It seems the South African and Limpopo governments met several of these criteria before February 2000. According to Kilian (4 June 2003), the NDM Centre collaborates with the South African Weather Service to track climatic hazards. This relationship between the NDMC Centre and the South African Weather Service permitted the Centre to identify, detect and monitor the two cyclones responsible for the February 2000 floods as they originated in the Indian Ocean (Kilian, email interview, 4 June 2003). "[Once the cyclones reached Madagascar], all the provinces that could

have been affected...had been issued with early warnings. According to [Limpopo] officials, this early warning enabled them to put some preventative measures in place before the actual disaster struck" (Kilian, email interview, 4 June 2003). In addition to technological forecasting, it seems Limpopo also relies on the services of its own population as part of its early warning system. The Province has established a toll free number to report floods; the flood warning number is 0800 333 111 (Mulaudzi, telephonic interview, 4 June 2003). If that method is unavailable, the public can alternatively notify the police, traditional leaders, NGOs, business leaders, or the Provincial Disaster Management Centre (Mulaudzi, telephonic interview, 4 June 2003). This early warning system, which relies, in part, on human capacity, may seem rudimentary. While that assertion may be true, it should be recognized that entirely mechanized warning systems are flawed. First, mechanized devices are prone to vandalism, and, second, the alarms are often ignored (Napier and Rubin, 2002). Third, most mechanical flood warning devices are expensive, and reliance on these systems can exacerbate the conditions of dependency, thereby reinforcing vulnerability (Waddel, 1983). As such, Limpopo's flood warning system seems to require little improvement.

An additional issue which the UN IDNDR's Scientific and Technical Committee stresses is that government officials and the population must be trained to prevent and mitigate disasters (United Nations, 1999c). It seems that South Africa's municipal governments have several concerns relating to this area. These concerns include impediments relating to: a lack of dedicated staff or funds to appoint full-time civil defence people; the use of existing staff to carry out civil defence work on top of their other functions; a lack of disaster management awareness in some historically disadvantaged communities; outdated equipment that is also in poor working condition; and, apathy towards disaster management, which has subsequently led to its not being budgeted for (Ministry for Provincial Affairs and Constitutional Development, 1998, p. 82-83). Thabane, Kruger and Moerane (1997) contextualized these problems by stating "the only constraint which the Directorate of Program Planning faces, is the staff component which is inadequate to successfully execute the envisioned functions of the Unit" (qtd. in Vogel, N.D., p. 22). Colleen Vogel, a South African disaster researcher, seems to agree; she has stated that the local level authority lack trained personnel to actively implement and manage disaster management initiatives (Vogel, N.D.). Kilian (16 January 2003) provides further support to this human capacity related criticism by saying that one of the "greatest limitations" of the current South African disaster management system is a "general lack of capacity and skills to effectively

deal with and promote disaster management" (email interview). Other "greatest limitations", according to Kilian (16 January 2003), include, "the difference in mindsets towards disaster management and the difficulty of increasing the profile of disaster management (email interview). These human capacity concerns are very problematic, and were demonstrated by some of the Health and Welfare officials responding to Limpopo's February 2000 floods. It seems some of the Health and Welfare officials did not understand the importance of medium- and long-term response processes, which are equally if not more important than the initial response process. It is during these periods that the government is able to reconstruct public infrastructure rendering it less vulnerable to hazards than the previous designs. It is also an appropriate time to conduct hazard awareness training. Unfortunately, media and public attention to reconstruction is limited, this adversely impacts on the ability to the government to maintain public support and provide adequate assistance and training. During the February 2000 Limpopo floods, two of the medium-term threats were cholera and malaria. According to the South African Health Review 2000 (2000), this realization prompted the Department of Health and Welfare to establish its own Operations Centre to deal with concerns of disease outbreaks, to restore health and nutrition services, and to focus on planning for longer-term problems such as malnutrition (Health Systems Trust, 2000, p. 7). However, when public support began to wane, cooperation from some health officials became deficient; managers had to order staff to attend briefings, and the Centre had to be run largely by students and volunteers (Health Systems Trust, 2000, p. 7). If the managers were not as diligent as they were, the problems arising from the Limpopo floods may have been compounded by the occurrence of malaria and malnutrition. Mulaudzi (4 June 2003) explains that "managers were sent for training on disaster management" (telephonic interview); nonetheless, it seems clear that that the South Africa government experiences human capacity problems in the field of disaster management and risk reduction.

In order to increase the profile of disaster preparedness, Member States were asked to formulate multisectorial national committees or focal points for disaster reduction (United Nations General Assembly Resolution 44/236, qtd in United Nations, 1999c, p. 9). The South African government responded by establishing a national committee (United Nations, 1999a). According to Mulaudzi, a Provincial Disaster Management Committee, where all stakeholders are represented, was also established; "this Committee was in place before the February 2000 floods" (Mulaudzi, telephonic interview, 4 June 2003). However, "the February 2000 floods

demonstrated that we [the government] lacked capacity" and so "the Joint Operational Committee (JOC) was established" (Mulaudzi, telephonic interview, 4 June 2003). Other recent developments include the establishment of the Command Centre for Flood Relief and Emergency Reconstruction, which is examined in Section 3.2 of this study (Daily Dispatch, 13 December, 2000). These recent developments suggest that in February 2000 the government was, perhaps, not as prepared for a major natural hazard as it should have been. These developments also suggest that the South African government is committed to disaster risk reduction and is attempting to build disaster risk reduction capacity in provinces, metropolitan, district and local municipalities. This supposition is examined in greater detail in a following sub-section titled Assembly and Coordinating of Emergency Response Teams/Assessment of Clients Needs.

The final "primary area" of disaster reduction examined by the IDNDR's Scientific and Technical Committee involves initiatives of city officials and local level organizations (United Nations, 1999c, p. 6-9). According to Mulandzi (4 June 2003), several local initiatives occurred in Limpopo (telephonic interview). He (4 June 2003) says, "there are Coordinators in each municipality to report floods" (telephonic interview). "The police, traditional leaders, NGOs such as the Red Cross, and business leaders have also become involved in flood monitoring and reporting... Most of the present services were in place before the February 2000 floods" (Mulandzi, telephonic interview, 4 June 2003). This suggests that local communities in Limpopo had been actively involved in disaster risk reduction prior to the February 2000 floods. This local involvement in disaster risk reduction is important, as "local officials are those most immediately involved with hazards, and have a direct responsibility in managing the risk" (United Nations, 1999c, p. 9). However, an astute examination of the remaining three "stages of relief" suggests that Limpopo is, perhaps, not as prepared for a major natural disaster as it should be. The following sub-sections examine this in greater depth, first, by examining how the South African government relayed its disaster warning to the public in response to the February 2000 heavy winds, rains and floods.

Relayed Disaster Warning

An effectively relayed disaster warning includes an accurate warning to the public from a variety of sources, including a clear and informed statement of instructions for effective action to

minimize the consequences of the hazard, and a timorous disaster declaration issuing quick access to provincial and national resources (United Nations, 1999c, p. 8; Health Systems Trust, 2000). These coordinated activities are critical for early warning to become an essential element of any comprehensive disaster prevention strategy (United Nations, 1999c, p. 8). When asked "was early flood warning relayed to both Limpopo's urban and rural population during the February 2000 floods", Kilian (4 June 2003) asserts yes, it was (email interview). "The warning were done through the South African Weather Service by means of the media, radio and television, as well as by means of SMS on mobile phones to provincial disaster management coordinators" (Kilian, email interview, 4 June 2003). Mulaudzi (4 June 2003) further explains,

> "there are two-way radios at most municipal offices...We work with the South African Weather Service and warn people using two-way radios communicating in four different languages...In an emergency, we also telephone municipal leaders. We also warn people if floods from other provinces threaten Limpopo. The SANDF has the responsibility to aid people we cannot warn" (telephonic interview).

As such, it seems the South African government attempted to issue disaster warnings to Limpopo's urban and rural population during the February 2000 floods. According to Kilian, "this enabled them [the Province's population] to put some preventative measures in place before the actual disaster struck" (email interview, 4 June 2003). It seems, then, that Limpopo's relatively efficient relayed disaster warning played a constructive role during the floods.

Assembly and Coordination of Emergency Response Teams / Needs Assessment

Romasobane (22 January 2003) suggests, "we [the government] never had a disaster management system in place" during the period of the February 2000 Limpopo floods (telephonic interview). This lack of planning may have impeded the liaison and coordination between government departments in the early stages of Limpopo's flood relief process, which may have, in turn, exasperated the effects of the floods. Coordination problems were listed as one of the most significant limitations of South Africa's former reactive disaster management system (Ministry for Provincial Affairs and Constitutional Development, 1998). It seems these problems may have transcended South Africa's early shift to a proactive disaster risk reduction

system. It also seems the government is attempting to rectify these concerns. Corrective measures largely began when ministers and officials from Botswana, Mozambique, Zimbabwe, and South Africa met in Pretoria on the 3rd of March to discuss the effects of the floods in each country, as well as mechanisms for coordinating relief and rehabilitation (Government of South Africa, 3 March 2000). The ministers concluded their meeting by agreeing to better coordinate regional relief efforts and to evaluate their disaster management systems with the intention of enhancing their country's capacity to respond and mitigate disasters (Government of South Africa, 3 March 2000). They also decided that they would consider the establishment of a Southern African Development Community (SADC) Disaster Management Unit to pursue these aims (Government of South Africa, 3 March 2000). This agreement may have influenced the South African Cabinet decision to establish a Command Centre for Flood Relief and Emergency Reconstruction, under the political direction of the political head of the NDM Centre. According to the Centre's then Chief Executive Officer (CEO) Collin Matjila (December 2000), "the destruction caused by the floods, highlighted a need for a coordinated effort to get relief and repairs out to the hugely damaged infrastructure as quickly as possible" (qtd. in Daily Dispatch, 13 December, 2000). Accordingly, the government proposed that the Command Centre would oversee Limpopo's flood relief and reconstruction efforts.

The Command Centre for Flood Relief and Emergency Reconstruction was quickly established, is composed of experts seconded from the private sector and various NGOs, and reports to the emergency reconstruction committee (ERC), a Cabinet level team under the chairmanship of the Public Works Minister. The Centre is expected to:

- "Be able to operate around the clock on a emergency basis seven days a week;
- Assess and verify the flood damage;
- Prioritize the needs of the people worst affected;
- Ensure that, despite the emergency nature of the process, the proper administration procedures are adhered to and the reconstruction process is carried out in an open and transparent manner;
- Ensure the flood damaged infrastructure is repaired; and,

- Ensure that where possible reconstruction takes place in a manner and in areas where the same sort, or level, of disaster does not happen again" (Daily Dispatch, 13 December 2000).

The Government's announcement that it would establish a Command Centre for Flood Relief and Emergency Reconstruction may be perceived as an admission that the Government did not have the administrative capacity to adequately manage a hazard of the severity of the February 2000 Limpopo floods before the floods onset. This interpretation is in accordance with Kilian's (16 January 2003) suggestion that "the consequences of this particular disaster were much more severe than would have been the case if proper disaster management structures were in place" (email interview). While these assertions may suggest that the government was not adequately prepared for a major natural hazard before February 2000, the government's proposal to establish a command centre for flood relief and risk reduction is an good indication that the government is committed to improve its disaster risk reduction capabilities. Ramasobane (22 January 2003) provides further support to the suggestion that the Centre will reduce the risk of hazards by claiming that the "Command Centre is still effectively running" and through the Centre's efforts "higher [building] standards are being applied" (personal interview). Irrespective of the veracity of Ramasobane's (22 January 2003) statement, the government's decision to establish a command centre "to ensure that where possible reconstruction takes place in a manner...where the same sort, or level, of disaster does not happen again" is an excellent example of applied risk reduction (Daily Dispatch, 13 December 2000). This strategy to minimize the effects of natural hazards is considered to be a priority of the UN risk reduction approach to disasters with a natural trigger. As such, it appears the South African government is committed to improve its disaster risk reduction system.

Providing Services

It seems the South African government's initial relief efforts during the February 2000 Limpopo floods primarily involved rescuing stranded people, distributing food and clothing parcels, and repairing essential infrastructure in the same manner that the infrastructure had been constructed before being destroyed. According to Ramasobane (22 January 2003), the government exercised a definite lack of preventative measures to minimize the impact of the

heavy rains and floods (telephonic interview). Or, in Romasobane's (22 January 2003) own words, the governments response "was mainly reactive...really there was no preventative action" (telephonic interview). Romasobane's (22 January 2003) statement corresponds with Kilian's (4 June 2003) assertion that Limpopo "put some preventative measures in place before the actual disaster struck" however "these still proved to be inadequate" (email interview). This suggests that the South African government did not undertake the proactive steps necessary to mitigate the adverse effects of a large-scale hazard such as the February 2000 Limpopo winds, rains and floods. It is this author's position that the results of this limited effort may have increased the destructive and disruptive effects of the resulting floods. Romasobane seems to agree. He suggests that "people tried to cross-rivers and people died, because *we did not have a disaster management system in place* [italics added]" (Ramasobane, telephonic interview, 22 January 2003). Ramasobane's (22 January 2003) statement highlights once again the life-threatening dangers of failing to implement systems that are now accepted as best practice by the UN.

The National Cabinet did not even respond to the floods until February 16th; by that time it was noted that Limpopo had experienced "levels of destruction which are the worst in living memory" (qtd. in Mufamadi, 1 March 2000). Cabinet's first act involved the decision that urgent steps should be taken to provide relief to Limpopo. Cabinet's assistance package entailed the following steps:

- "Ministers were instructed to compile department specific action plans. These plans would be consolidated into a single government plan.
- Urgent funding to be granted to...[Limpopo] by way of continuing rescue operations, repair [sic.] priority public infrastructure, as well as to provide general relief to affected communities.
- Provision of direct financial assistance to the Kruger National Park" (Mufamadi, 1 March 2000).

In brief, the National Cabinet responded extremely belatedly to the Limpopo floods. Had it responded earlier, it may have been able to coordinate the provision of direct financial assistance to the flood victims and, thus, could have mitigated some of the disruptive effects of the hazard.

By the 23rd of February, the Premier of Limpopo stated that reconstruction and repair work was underway, and that the Province had so far distributed 5,300 food parcels, each containing enough provisions to feed one family for two weeks (Business Day, 23 February 2000). Also by this time, an estimated forty people had been killed in flood related incidents, and security forces had reportedly rescued 32 (Business Day, 23 February 2000). The Joint Operations Centre ordered 132 tents, which arrived in Pietersburg that day; and, the Health and Welfare Department purchased R1.5 million worth of water purification supplies and insect repellents at a reported cost of R2 million (Business Day, 23 February 2000).

By the 27th of March, the rains had tapered off, and the Limpopo River's water level was decreasing. According to the United States Agency for International Development (USAID), "work was proceeding on repair of important bridges in agricultural areas to enable farmers to salvage their fruits and vegetables and transport them to the market" (qtd. in United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000). Also during this time, USAID announced that the Government of South Africa, the private sector, local and international NGOs and other donors continued to be involved in Limpopo's relief effort (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000). Until this point in time, due to the isolation of many affected areas, the Limpopo government relied heavily on the SANDF helicopters for search and rescue operations, but relief was reaching a new phase with the end of search and rescue operations (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000). According to USAID, "assistance was now targeted at humanitarian relief and infrastructure repair. The current priority focuses on repair of roads to isolated areas, so that essential relief may be delivered" (qtd. in United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000).

As the floodwaters began to recede, the South African government reported two new disaster risk reduction initiatives. The first initiative involved the establishment of the Command Centre for Flood Relief and Emergency Reconstruction, which is examined in Section 3.2 of this study. The government's second major disaster risk reduction initiative is a policy document titled the Plan for Reconstructing Flood-Damaged Public Infrastructure in the Northern Province

2000 (Office of the Premier of the Northern Province, 2000). The Plan for Reconstruction originated from the Office of the Premier of Limpopo, and provides the policy framework for the management of the reconstruction of flood-damaged public infrastructure in the Province. The objectives of the Plan are to meet two criteria: first, to "enable accessibility to basic levels of services"; and second, to "assist the economy to function and grow" (Office of the Premier of the Northern Province, 2000, p. 7). The Plan also describes: the reprioritization of the Provincial Budget to address the damage; the reconstruction of infrastructure that is deemed important for the growth of the economy; the reconstruction of damaged schools, hydro systems, infrastructure on state farms and games reserves; and, finally the reconstruction of damaged private homes.

Included within Limpopo's reconstruction plans is a section devoted to "designing flood resistant infrastructure", such that it is more flood-resistant than previous designs. The section identifies possible problems with the earlier designs and proposes how these limitations should/will be rectified. For example, the document identifies a major cause of bridges being washed away as resulting from the accumulation of plant debris in front of the bridge openings. In order to remedy this concern, the Government proposes to enlarge bridge spans and build larger openings. A second identified problem with the bridges' earlier designs is that several of the bridges were designed with floating decks. Normal silting of the riverbed reduced the designed free water board height, as well as the opening of the bridges. In order to address this design weakness, the Government proposes to examine the possibility of incorporating rigid decks (designed to be flooded). A final weakness with the earlier bridge designs relates to the fact that several of the bridges failed because the piers sank into the riverbed - i.e. the earlier designs did not support the piers, and thus the bridge, on an appropriate foundation. In order to rectify this problem, the Government proposes to reconstruct all the bridge piers on a foundation of rock, or on piles of rock.

Concerning roads, the Government notes that damages were especially concentrated where the roads are designed to closely follow the riverside. In order to remedy this concern, the Government proposes to rebuild the roads at a greater distance from the riverside and, where this is not possible, to protect against erosion at river bends. Reportedly, the damage to roads was also especially prevalent in areas where the road was constructed below the existing ground - i.e. in an earth or rock cut. It appears these areas did not provide sufficient water drainage. Thus, the Government proposes to provide more substantial subsurface drainage. Other problems with the

roads occurred in areas where there was clay beneath the surface. When the ground flooded, the clay absorbed the water and subsequently shifted, collapsing the roads. In areas such as these, the Government proposes to remove the clay to a greater depth. The Office of the Premier of Limpopo suggests that these adjustments should make the roads and bridges more flood resistant (Office of the Premier of the Northern Province, 2000); while this may be true, it may be more cost effective to incorporate a non-structural approach that incorporates concerns for better management of riparian vegetation. As suggested by Abramovitz (2001), healthy and resilient ecosystems protect against the adverse effects of heavy rains by absorbing floodwaters. As such, non-structural approaches that prevent over-vegetation and control alien plants may be equally effective and more cost efficient than the structural strategies proposed by the Office of the Premier of Limpopo (2000).

In order to make the damaged schools more flood-resistant the Plan specifies that the Government intends to assess the vulnerability of the soils on which the schools are located. It seems some flood-damaged schools were located on areas where there was not sufficient surface water drainage. If hazard assessments suggest that the soil is unstable, the Government claims it will relocate the schools.

The Government could not identify a consistent problem with the hydro system; it seems each site had a different problem. Perhaps as a result, the Government claims that each site will be individually assessed and remedied accordingly.

A significant recommendation of the flood-damaged reconstruction plan involves the restoration of flood-damaged homes. The Plan specifies, "the provincial Department of Housing is reprioritizing its R257 million budget for the 2000/2001 financial year to address the needs of people affected by the disaster" (Office of the Premier of the Northern Province, 2000, p. 10). The Plan also outlines that "budgets which were previously allocated to the construction of new townships are being reallocated to the rebuilding of damaged existing homes" (Office of the Premier of the Northern Province, 2000, p. 10). If the new home designs incorporate risk-proofing measures against known and expected threats, and if particular attention is paid to managing surface water run-off, this redirection of funds may reduce the vulnerability of those people who have proven to be especially risk prone.

Limpopo's Plan for Reconstructing Flood-Damaged Public Infrastructure in the Northern

Province, 2000 is comprehensive and very detailed (Office of the Premier of the Northern Province, 2000). It outlines the prioritization of projects and outlines clear disaster risk reduction strategies. Missing from the report, however, is the proposed use of non-structural flood mitigation strategies. As suggested earlier in this dissertation, unless structural adjustments are complemented with non-structural measures the reconstructed infrastructure may still be vulnerable to hazards. Because of this concern, the author of this study asked Ramasobane the following question: "Did the government complement the structural repairs with non-structural changes? If not, why not?" (telephonic interview, 22 January 2003). Ramasobane (22 January 2003) responded by saying, "No non-structural changes [were made]. Takes too long. I would say that we would like to make non-structural changes, but those ideas are regarded as long-term strategies. Right now the key thing is the structure" (telephonic interview). Ramasobane's (22 January 2003) opinion may be justified, given his estimation that, to date, nearly three years following the onset of the floods, only 50- to 60-percent of the intended repairs have been completed (telephonic interview). This having been said, the author of this dissertation strongly believes that non-structural adjustments should have been proposed at the same time as the structural strategies. If non-structural strategies were implemented with the structural strategies the reconstructed infrastructure may not experience excessive early stresses that will cause premature wear and damage. In other words, the life of the infrastructure may be prolonged. Some non-structural policies that, perhaps, should be considered include Abramovitz's (2001) suggestion to apply ecological approaches that incorporate better management of riparian vegetarian. One possible strategy that Ambramovitz (2001) explains involves the removal of over-vegetation in dry riverbeds after periods of drought; this strategy reduces the risk of vegetation obstructing bridges and other narrow channels during periods of flooding. It should be noted that this ecological strategy may be more cost effective than several of the Limpopo government's proposed structural suggestions, including the strategy to enlarge bridge span opening (Office of the Premier of the Northern Province, 2000). Other possibly beneficial non-structural strategies include a decrease of the maximum weight limit permitted to vehicles using the road and bridge network, as well as the time period permitted between routine maintenance checks. These non-structural changes may prevent the premature deterioration of the road and bridge network, which would, therefore, reduce costs. As such, non-structural strategies should

have been incorporated into the Plan for Reconstructing Flood-Damaged Public Infrastructure in the Northern Province, 2000 (Office of the Premier of the Northern Province, 2000).

The final section of Limpopo's plan for reconstructing flood-damaged public infrastructure explains the project's funding, or lack thereof. It seems the Department of Public Works is allocated R200 million per year from the Provincial budget, 70 percent of which goes directly to workers' salaries (Office of the Premier of the Northern Province, 2000). The report also explains that over 85 percent of the provincial budget is spent on social services, thereby, leaving very little room for reprioritizing the budget to fund the reconstruction effort (Office of the Premier of the Northern Province, 2000). This illustrates the high levels of poverty in Limpopo and the lack of resources to effectively implement risk reduction strategies. It is clear that the implementation of the plan for reconstructing the flood damaged public infrastructure is dependent on the national budget and private donations. Perhaps, equally distressing is the fact that the Province's initial stipend from the national government was only R93 million and that this funding was not allocated until June, four months following the onset of the February 2000 floods (Jackson, 18 February 2001). As described by South Africa's public works minister, Stella Sigcau, "finding money for reconstructing flood-damaged infrastructure was...an immense problem" (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 13 March 2000). This statement is further illustrated by the fact that the national government did not release the first tranche of funding until September, seven months following the beginning of the floods (Jackson, 18 February 2001). Worse still, the national government did not release its second phase of funding until the 7th of February 2001, an entire year after the onset of the floods (SABCnews.com, 7 February 2001). Of the total R1.15 billion that the national government disbursed, Limpopo, the province which experienced the highest level of destruction in South Africa, only received R250 million (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000; SABCnews.com, 7 February 2001). This figure is a mere fraction of Limpopo's estimated flood damage of R2.355 billion. This result of this lack funding is that Limpopo was not able to carry out the majority of its intended plans to rebuild infrastructure using risk reduction techniques. According to Ramasobane (22 January 2003),

> "we did whatever we could with the minimum of resources. That means we were not able to action most of our plans because of financial limitations. People were more concerned with clear passage [then with disaster risk reduction]. We did not do 100 percent because of costs. We tried, but our funding limited us" (telephonic interview).

Ramasobane (22 January 2003) goes on to say that the Department of Education was forced to rebuild the schools using the same hazard prone techniques used in the past, due to financial constraints. This suggests that an estimated R84 million of school infrastructure is equally if not more vulnerable now as it was before the onset of the floods (Office of the Premier of the Northern Province, 2000). This is very distressing. However, Ramasobane (22 January 2003) does explain that some positive developments have occurred. For example, when asked, "do you believe the Province's infrastructure is more flood-resistant than before the floods?", Ramasobane (22 January 2003) replies,

> "yes, the roads are more flood-resistant. The bridges are stronger. Higher standards are being applied, which is strengthening them. For example, the bridges were very narrow. They have since been enlarged, which has subsequently strengthened them by 100 percent" (telephonic interview).

There may also be improvements to private housing. These possible improvements came as a result of the Department of Housing's reprioritization of its budget to address the needs of people affected by the disaster (Office of the Premier of the Northern Province, 2000, p. 10). For example, on the 11th of October 2001, the Minister of Housing, Sankie Mthembi-Matlala, announced a completed disaster relief project in Moletsi-Matlala, where 555 houses were erected to benefit 23 villages (Malale, October 2001). On 14 October 2001, the same Minister unveiled a second completed disaster relief project in Giyani, where 1,264 houses were built for 10 flood-affected communities (Malale, October 2001). Coinciding with these developments in Limpopo, 450 homes were built for victims of the 2000 floods in Mkhuze in KwaZulu-Natal, at the expense of R2 million (Malale, October 2001). These reconstruction initiatives may reduce the vulnerability of those people proven to be at an increased risk; as such, the initiatives are a significant contribution towards assisting those people affected by the floods. This having been

said, Ramasobane (22 January 2003) suggests that the Office of the Premier of Limpopo could have done more to reduce the population's vulnerability to hazards had the province received more adequate funding (telephonic interview). This notion is a reiteration of this author's suggestion that the emergency relief budget was insufficient to meet the demands of a major hazard.

Since February 2000, the South African government has made progress in the field of disaster risk reduction. For example, the government has strengthened several sections of public infrastructure; it has improved flood relief coordination, and has rebuilt some of the flood damaged private homes which, if the home designs incorporate risk-proofing against known and expected threats and particular attention is paid managing surface water run-off, may be more flood-resilient than the previous designs. As suggested by Ramasobane (22 January 2003), South Africa's disaster risk reduction system "is at a conceptual stage" (telephonic interview). Kilian (16 January 2003) expands on this later statement by saying,

> "the provisions of the Disaster Management Bill have not yet been implemented. A number of positive actions have however taken place in anticipation of the promulgation of the Disaster Management Act... The real implementation of the Bill will commence once the Disaster Management Act has been promulgated" (email interview).

This notion of South Africa's disaster risk management system being in its early establishment is, perhaps, most adequately illustrated in Limpopo. According to Ramasobane (22 January 2003), "right now, we do not even know where the roads and bridges are. So, disaster risk reduction currently involves a road management system. We are information gathering, so that long-term maintenance and repair can be properly managed" (telephonic interview). This statement highlights the foundation upon which South Africa has had to develop its disaster risk reduction strategy. Ramasobane's (22 January 2003) statement also suggests that it may be a considerable period of time before every municipality is able to determine levels of risk and assess their vulnerability to hazards, as dictated by the Disaster Management Act. Nonetheless, the policy evidence presented in this study suggests that the government has provided an enabling environment for disaster risk reduction. At the applied level, the February 2000

Limpopo floods suggests that the government is in a transitory period between emergency management and effective disaster risk reduction.

The South African government seems to be committed to disaster risk reduction. This is demonstrated by the implementation of the Plan for Reconstructing Flood-Damaged Public Infrastructure in the Northern Province, 2000 and by the establishment of Command Centre for Flood Relief and Reconstruction (Office of the Premier of the Northern Province, 2000). As such, it seems the government of South Africa is adhering to its intended shift to disaster risk reduction. It also seems clear that more effort and financing is required before it can be successfully argued that South Africa is correctly exercising all the fundamental principles of disaster risk reduction. The following chapter examines this conclusion in greater depth. The chapter concludes by suggesting that the government of South Africa is adhering to its intended shift to disaster risk reduction and that more effort is required before it can be argued that South Africa is practicing all the necessary fundamental principles this new paradigm.

CHAPTER 4: CONCLUSION

The purpose of this study was to examine whether or not South Africa is adhering to its intended shift from emergency management to a comprehensive approach to hazards and disasters that focuses on reducing the risk through development plans, programmes and initiatives. This study begins by examining the processes that initiated the international disaster management evolution from "a very 'hazards' oriented process to the current 'development-oriented' platform" (Ailsa Holloway, email communication, 27 May 2002). According to the South African Ministry of Provincial Affairs and Constitutional Development (1998), the major challenge for South Africa in keeping with international trends has been how to improve its "disaster... risk reduction policies and practices so that they become integral aspects of existing strategies to achieve sustained development and social equity" (p. 6). This study concludes by suggesting that South Africa has demonstrated a firm commitment to disaster risk reduction. In other words, South Africa seems to be adhering to its intended shift to disaster risk reduction. The South African government has, for example, recently promulgated a Disaster Management Act that encompasses disaster risk reduction ideals. In doing so, the government has committed itself to reducing the underlying pressures that result in disasters; the remainder of this chapter examines this conclusion and the processes involved in greater depth. This study also suggests that while the government seems to be making an enormous effort to reduce the risk of disasters, the government has so far failed to implement several risk reduction strategies that should have been put in to operation. The chapter, and therefore the study, concludes by, first, examining these neglected strategies and, second, by discussing the implications that may arise from this fundamental change in approach to hazards, disasters and sustainable development.

South Africa began to examine the validity of the disaster risk reduction approach in 1994. Evidence supporting this notion can be found in Kilian's testimony, established throughout this study, as well as in South Africa's Green and White Paper on Disaster Management, and the Disaster Management Bill and Act (email interview, 16 January 2003; Ministry of Provincial Affairs and Constitutional Development, 1998; Department of Constitutional Development, 1998; Department of Provincial and Local Government, 2002; Department of Provincial and Local Government 2003; The Presidency, 2003). Nearly ten years later, the South African Disaster Management Act has been promulgated but has not been implemented. However, this

study has shown that the disaster risk reduction mechanisms of the Act seem to be well established within the governing body. Evidence supporting this notion can be found in the hazard mitigation developments that occurred in anticipation of the implementation of the Act. According to Kilian (16 January 2003) some of these developments include: "the establishing of the NDM Centre [and] the establishing of a political disaster management forum as well as institutional structures in the national and provincial spheres of government" (email interview). Other mitigation measures occurred during and after February 2000, most notably during the reconstruction period of the flood-damaged infrastructure in 2000. The most notable hazard mitigation developments to occur include the structural improvements to the road and bridge network, improvements to private housing and the establishment of the Command Centre for Flood Relief and Emergency Reconstruction (Ramasobane, telephonic interview, 22 January 2003; Office of the Premier of the Northern Province, 2000). While the introduction of these structural and institutional improvements are beneficial, this study has provided a significant body of evidence supporting the notion that an over-reliance on structural strategies will continue to provide disappointing results in sustained commitments to risk reduction (United Nations International Strategy for Disaster Reduction, 2002a, p. 17). As such, the South African and Limpopo government should have made a greater political and applied commitment towards the use of non-structural mitigation measures in their efforts to reduce the root causes, dynamic pressures and unsafe conditions that result in disasters (Blaikie et al., 1994). This suggestion is examined in greater detail over the remainder of this study.

As previously established, the UN ISDR (2002a) suggests that "there are fundamental elements in every disaster reduction strategy, but the priorities, relative emphasis, available resources and specific ways of implementation must take account of practices that are most suited to local conditions, understanding and effectiveness" (p. 22). As such, a commitment to disaster risk reduction must include vulnerability and risk assessments (United Nations International Strategy for Disaster Reduction, 2002a). South Africa's Disaster Management Act (2002) specifies that people from all sectors will conduct risk and vulnerability assessments. However, the Act has not been implemented and risk and vulnerability assessments have not been performed in anticipation of the Act. Human capacity issues and funding concerns outlined within this study suggest that it may be a significant period of time before this critical strategy has been achieved in South Africa. Until that period of time, this author recommends that South

Africa must increase public awareness of risk reduction. A "safety culture" must be established whereby people understand that inappropriate use of resources is a contributing factor to disasters (United Nations International Strategy for Disaster Reduction, 2002a). In other words, both government officials and the public must be educated in a comprehensive and participatory manner that social, economic, physical and environmental vulnerabilities are contributing factors to the "risk = hazard + vulnerability" equation" (United Nations International Strategy for Disaster Reduction, 2002a; Blaikie et al., 1994, p. 23). The reconstruction period of the Limpopo floods provided an opportune time to conduct hazard awareness training; however, it seems the government neglected to take full advantage of this opportunity. The government should not repeat this mistake in the aftermath of a disaster again. This having been said, the South African government did participate in the UN IDNDR Programme Forum and used the Forum as a stimulus for developing public policy and an institutional framework for disaster risk reduction. The next step is to apply those disaster risk reduction policies. Vulnerability and risk reduction assessments must be performed and, based on the attained information, the government must encourage and apply environmental management, including effective land use planning and strategies to protect critical facilities (United Nations International Strategy for Disaster Reduction, 2002a). The government should also establish partnerships and develop financial tools for disaster risk reduction (United Nations International Strategy for Disaster Reduction, 2002a). Finally, and perhaps most importantly, the South African government must address the nation's limits to disaster risk reduction set by economic and social inequalities, cultural biases, and political injustices (Blaikie et al., 1994). As demonstrated within this study, the Limpopo Province was severely affected by the February 2000 floods (Office of the Premier of the Northern Province, 2000); the Province is poor, and vulnerability is a factor of poverty (May, 2000; Lavell, 1994, qtd. in Khandlhela, 2002). Unless the government significantly improves the living conditions of the poor through socio-economic development, the poorer segments of the population will always be disproportionally vulnerable to the adverse effects of hazards. Thus, risk reduction will only be achieved with a thriving economy that provides people with the means to acquire the type of infrastructure that makes them less vulnerable to the adverse effects of hazards. The application of these socio-economic strategies should minimize the root causes, dynamic pressures and unsafe conditions that contribute to the progression of vulnerability that leads to disasters (Blaikie et al., 1994).

South Africa's traditional emphasis on disaster response and humanitarian assistance has absorbed significant amounts of resources, which, according to the UN ISDR (2002b), could have been allocated for development efforts. "If this trend were to persist, coping capacities... [would] likely be overwhelmed" (United Nations International Strategy for Disaster Reduction, 2002b, p. 7). Abramovitz (2001) suggests that "on average, US 1 Dollar invested in mitigation saves US 7 Dollars in disaster recovery costs" (p. 124). While it is not clear whether South Africa will experience similar saving, this study has shown that disasters in South Africa can be very costly. The February 2000 Limpopo floods, for example, cost the province an estimated R2.355 billion in infrastructure losses (Office of the Premier of the Northern Province, 2000). On a national level, the floods resulted in the South African government having to dissipate a total R1.15 billion for emergency reconstruction (United Nations Office for the Coordination of Humanitarian Affairs Integrated Regional Information Network for Southern Africa, 28 March 2000; SABCnews.com, 7 February 2001). If funds for disaster recovery can be redirected in South Africa, towards socio-economic, environmental and health issues, this may result in huge, presently unimaginable, development gains which may, in turn, result in sustainable communities, thereby reducing vulnerability and increasing the quality of life for all South Africans.

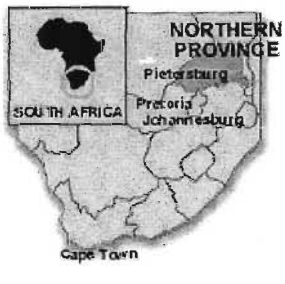
Some may argue that South Africa's efforts to advance its disaster risk reduction policies and practices to achieve sustainable development and social equity are progressing too slowly. While this may be the case, the author of this dissertation would conversely argue that the speed at which the government's disaster risk reduction system is advancing is limited by the foundation upon which it is based. Ramasobane seems to agree; he has stated that the Office of the Premier of Limpopo cannot account for all the roads and bridges in the Province (Ramasobane, telephonic interview, 22 January 2003). With a deficit of information of this sort, the implementation of effective risk reduction strategies is extremely difficult. As such, it may be a considerable period of time before each local municipality and district has the capacity to conduct its own vulnerability assessment - but this seems to be of no fault of the *current* government.

This having been said, it would appear as though the government of South Africa is adhering to its intended shift, from emergency management to a disaster risk reduction, albeit very slowly. The government needs to focus on the awareness of hazards, the condition of

human settlements and infrastructure, the nature and applicability of public policy, the resources available to society and organizational abilities in all fields of disaster and risk management, and it needs to do so in a more time conscious manner (United Nations International Strategy for Disaster Reduction, 2002b). If the government of South Africa does not speed up the implementation of its disaster risk reduction processes, it may re-experience preventable socioeconomic loss. A strategy that the government should consider to accelerate its risk reduction efforts is to reduce the ambiguous language in the Disaster Management Act (The Presidency, 2003). In its current form, the Act does not seem to outline funding mechanisms for mitigation and prevention. Kilian (19 September 2003) argues that the issue of responsibility for risk reduction being devoted to municipalities as an "unfunded mandate" is "subject to many different opinions" (email interview). This funding ambiguity is problematic as it may prevent poorer municipalities from initiating and completing the risk and vulnerability assessments, which would in turn stifle the national disaster mitigation efforts. As explained earlier in this study, the Disaster Management Act's Framework must remedy the prevention and mitigation funding ambiguity and funds must be made available to all especially vulnerable municipalities. Until then, it can only be argued that South Africa is in the process of providing an enabling environment for disaster risk reduction and that a greater effort is required from all stakeholders. The evidence provided by this study, therefore, suggest that it may be a considerable period of time before South Africa can be said to be exercising all the fundamental principles of disaster risk reduction.

Annex A: Map of Limpopo by Geophysical Region: Highveld and Lowveld

Figure 2: Map of Limpopo by geophysical region. Source: http://www.weathersa.co.za, 6 November 2003.



Source: www.limpopo.gov.za/ aboutprov, 6 November 2003.

A unique feature of this province is that it shares international borders with three countries: Botswana to the west and northwest, Zimbabwe to the north, and Mozambique to the east. The Limpopo Province is the link between South Africa and countries further a field in sub-Saharan Africa. On its Southern flank, the province shares borders with Gauteng, with its Johannesburg-Pretoria axis, the most industrious metropole on the continent. Thus the province is placed at the centre of the vortex of developing markets, regional, national and international. These connections are very well served by excellent road, rail and air links. The N1 route from Johannesburg, which goes through the length of the province, is the busiest overland route in Africa in terms of cross border trade in raw materials and beneficiated goods. The port of Durban, Africa's busiest, is served directly by the province, as are the ports of Richard's Bay and Maputo. The other most significant facility in the province as the heartland of an emerging market is the Gateway international airport situated in Pietersburg the capital of the province.

Source: http://www.limpopo.gov.za/aboutprov, 6 November 2003.

Annex B: United Nations Resolution 44/236: National Recommendations

As specified in UN resolution 44/236, the following policy measures are to be taken at the national level.

"All governments are called:

A. To formulate national disaster-mitigation programs, as well as economic, land use and insurance policies for disaster prevention, and, particularly in developing countries, to integrate them fully into their national development programs;

B. To participate during the Decade in concentrated international action for the reduction of natural disasters and, as appropriate, establish national committees in co-operation with the relevant scientific and technological communities and other concerned sectors with a view to attaining the objective and goals of the Decade;

C. To encourage their local administration to take appropriate steps to mobilize the necessary support from the public and private sectors and to contribute to the achievement of the purposes of the Decade;

D. To keep the Secretary-General informed of the plans of their countries and of assistance that can be provided so that the United Nations may become an international centre for the exchange of information and the co-ordination of international efforts concerning activities in support of the objective and goals of the Decade; this enabling each State to benefit from the experience of other countries;

E. To take measures, as appropriate, to increase public awareness of damaging risk probabilities and of the significance of preparedness, prevention, relief and short-term recovery activities with respect to natural disasters and to enhance community preparedness through education, training and other means, taking into account the specific role of the news media;

F. To pay due attention to the impact of natural disasters on health care, particularly to activities to reduce the vulnerability of hospitals and health centres, as well as the impact on food storage facilities, human shelter and other social and economic infrastructures;

G. To improve the early international availability of appropriate emergency supplies through the storage or earmarking of such supplies in disaster-prone areas" (United Nations, 1989, Annex).

Annex C: Yokohama Strategy and Plan of Action for a Safer World: National Recommendations

The Yokohama Strategy and Plan of Action for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation (1994) outlines specific national recommendations that involve the disaster management paradigm shift from emergency management to disaster risk management. The Yokohama policy national recommendations explicitly state:

"During the remaining part of the Decade all countries are called upon to:

(A) Express the political commitment to reduce their vulnerability, through declaration, legislation, policy decisions and action at the highest level, which would require the progressive implementation of disaster assessment and reduction plans at the national and community levels;

(B) Encourage continued mobilization of domestic resources for disaster reduction activities;

(C) Develop a risk assessment program and emergency plans focusing efforts on disaster preparedness, response and mitigation, and design projects for sub-regional, regional and international cooperation, as appropriate;

(D) Develop documented comprehensive national disaster management plans with emphasis on disaster reduction;

(E) As appropriate, establish and/or strengthen National Committees for the Decade or clearly identified bodies charged with the promotion and coordination of disaster reduction actions;

(F) Take actions to upgrade the resistance of important infrastructures and lifelines;

(G) Give due consideration to the role of local authorities in the enforcement of safety standards and rules and strengthen the institutional capacities for national disaster management at all levels;

(H) Consider making use of support from non-governmental organizations for improved disaster reduction at the local level;

(I) Incorporate disaster reduction prevention or mitigation in socioeconomic development planning based on the assessment of the risk;

(J) Consider the possibility of incorporating in their developmental plans the conducting of Environmental Impact Assessments with a view to disaster reduction;

(K) Clearly identify specific disaster prevention needs which could use the knowledge or expertise that may be available from other countries or from the United Nations system, for instance, through training programs designed to enhance human resources;

(L) Endeavor to document all disasters;

(M)Incorporate cost effective technologies in reduction programs, including forecasting and warning systems;

(N)Establish and implement educational and information programs aimed at generating general public awareness, with special emphasis on policy makers and major groups, in order to ensure support for, and effectiveness of, disaster reduction programs;

(O) Enroll the media as a contributing sector in awareness raising, education and opinion building in order to increase recognition of the potential of disaster reduction to save human lives and protect property;

(P) Set targets which specify how many distinct disaster scenarios can reasonably be given systematic attention by the end of the Decade;

(Q) Stimulate genuine community involvement and empowerment of women and other socially disadvantaged groups in order to facilitate capacity building, which is an essential precondition for reducing vulnerability of communities to natural disasters;

(R) Aim at the application of traditional knowledge, practices and values of local communities for disaster reduction, thereby recognizing these traditional coping mechanisms as a valuable contribution to the empowerment of local communities and the enabling of their spontaneous cooperation in all disaster reduction programs" (United Nations, 1994, p. 10-11).

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